MILITARY REVIEW

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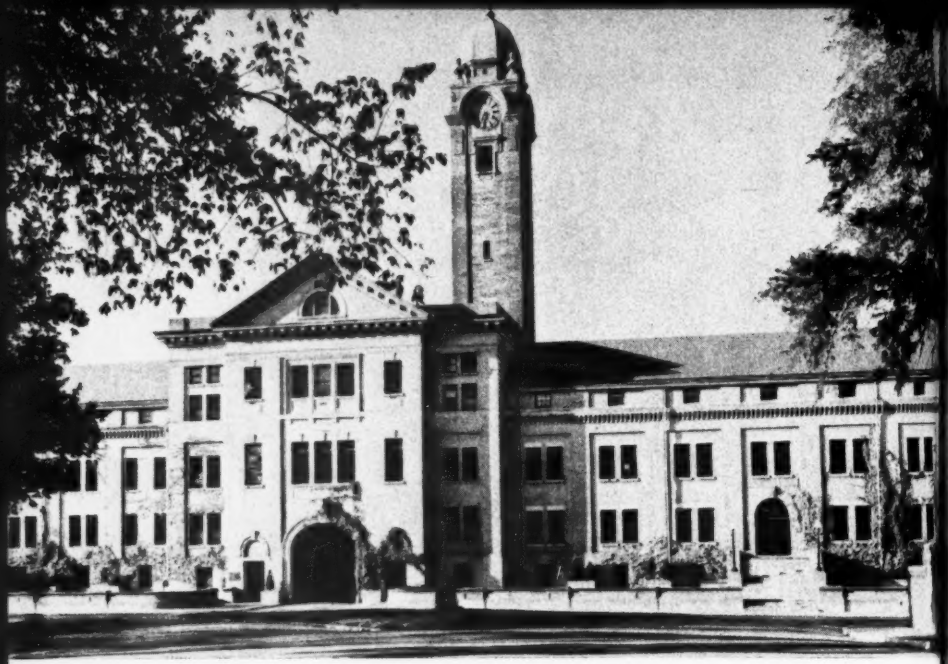
COMMAND AND GENERAL STAFF COLLEGE
FORT LEAVENWORTH, KANSAS

FEBRUARY 1952 VOLUME XXXI NUMBER 11



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VOLUME XXXI FEBRUARY 1952 NUMBER 11

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MILITARY REVIEW—Published monthly by the Command and General Staff College at Fort Leavenworth, Kansas, in the English, Spanish, and Portuguese languages. Entered as second-class matter August 31, 1934, at the Post Office at Fort Leavenworth, Kansas, under the Act of March 3, 1879. Subscription rates: $3.50 (U.S. currency) a year in the United States and other countries of the Western Hemisphere: $4.50 a year in all other countries.

Reprints are authorized, provided credit is given the "MILITARY REVIEW," CGSC, Fort Leavenworth, Kansas.

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The Arctic Can Be Our Ally

Lieutenant Colonel Joseph J. Peot, *Signal Corps*
Instructor, Command and General Staff College

This is the law of the Yukon, and ever she makes it plain:
"Send not your foolish and feeble; send me your strong and your sane—
Strong for the red rage of battle; sane, for I harry them sore;
Send me men girt for the combat, men who are grit to the core;"
*(From the poem "Law of the Yukon" by Robert Service)**

The views expressed in this article are the author's and are not necessarily those of the Department of the Army or the Command and General Staff College.—The Editor.

THE Arctic has been variously defined by astronomers, geographers, explorers, historians, and novelists—each unto his own purpose. For this reason, it will seem logical that the military consider a definition applicable to its operations. For the purposes of this article, the military Arctic may be defined as any area in the Northern Hemisphere in which climatic conditions force the application of the techniques of Arctic warfare; that is, where conditions of snow and extreme cold make necessary the use of special Arctic equipment and training. (See Figure 1.)

The conduct of operations in these areas will be affected by such factors as the low density of population, limited lines of communications, lack of shelter, and undeveloped natural resources.

Modern developments have given the Arctic areas a significant strategic importance. The shortest airline distance between the great land masses of the Northern Hemisphere is over the Arctic regions. (See Figure 2.) It is highly probable that in any future war our forces will be required to conduct operations under extreme Arctic conditions. While it is inconceivable that *major* military decisions will be effected under these extreme conditions, it is probable that operations under sub-Arctic conditions will be common and necessary to accomplish final victory.

The defeat of the German Army before Moscow in World War II can be attributed largely to its failure to recognize fully the problems incident to the conduct of military operations under the conditions of Arctic or sub-Arctic warfare. The long supply lines required to render adequate logistical support to these large German forces were made even more vulnerable because of the hardships and difficulties caused by Arctic winter conditions. The forces of Napoleon like-

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The Arctic can be our ally, for the nation which provides its troops and equipment with mobility, which trains its personnel properly, and which can motivate its troops adequately need not fear that region

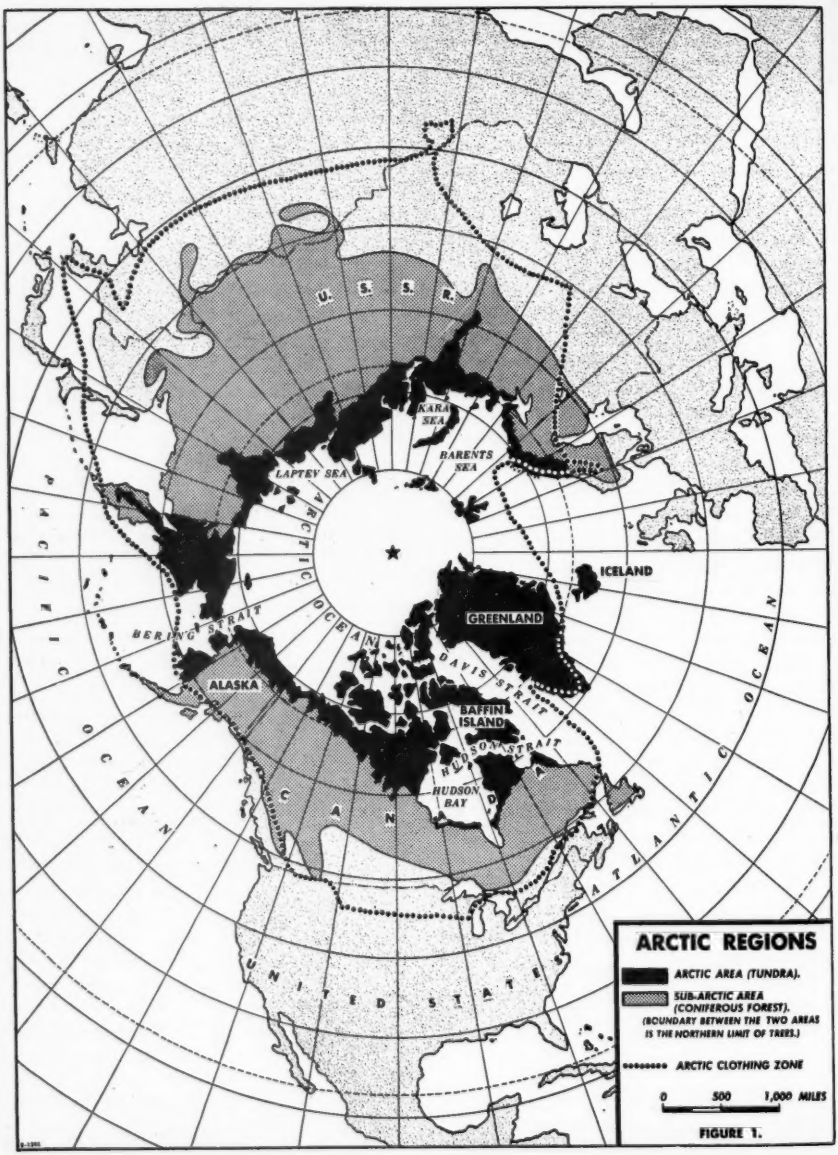

U. S. S. R.
KARA SEA
BARENTS SEA
LAPTEV SEA
ARCTIC OCEAN
ICELAND
GREENLAND
BERING STRAIT
DAVIS STRAIT
ALASKA
BAFFIN ISLAND
HUDSON STRAIT
HUDSON BAY
PACIFIC OCEAN
CANADA
ATLANTIC OCEAN
UNITED STATES
ARCTIC REGIONS
ARCTIC AREA (TUNDRA).
SUB-ARCTIC AREA (CONIFEROUS FOREST). (BOUNDARY BETWEEN THE TWO AREAS IS THE NORTHERN LIMIT OF TREES.)
ARCTIC CLOTHING ZONE
0 500 1,000 MILES

FIGURE 1.

wise were the victims of similar conditions. History is replete with examples of proud and mighty military forces who suffered defeat because of a failure to conquer the elements and the terrain. As enemies, they recognize no tactics, and abide by no principles of war. They can be conquered, however, by the proper application of the fundamentals of combat, and a proper appreciation of the problems which exist and which must be surmounted.

There are certain peculiarities, other than the cold, snow, or ice, of the Arctic and sub-Arctic which affect military operations. They are:

1. *Sparse settlement.*—The lack of industries, local supplies, quartering facilities, and lines of communications is notable. Control or destruction of these facilities, limited as they may be, become paramount.

2. *Lack of roads and railroads.*—Roads and railroads are almost nonexistent. Those few that do exist become highly vulnerable to enemy destruction, without the assistance of the elements and adverse climatic conditions, because of the existence of many bridges.

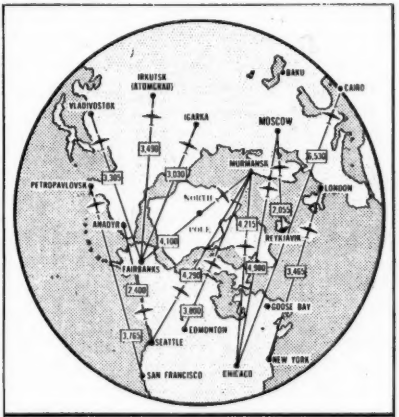
3. *Numerous lakes and waterways.*—When these are frozen—about 6 to 8 months of the year—they frequently offer a good road system. Snow is removed from the ice easily, and waterways may provide natural air strips.

4. *Lack of maps.*—Maps frequently are nonexistent or are unreliable. This complicates the problem of operational planning and necessitates special emphasis on reconnaissance and navigation. Greater importance is placed on aerial photographs, but these are affected adversely by the lack of contrast and the low actinic value of the sunlight. Greater emphasis, therefore, must be placed on scouting and woodsmanship, and navigation by the use of elementary astronomy.

It is these peculiarities which create the great problems of Arctic warfare—the problems of mobility, survival, and logistical support.

Concept of Arctic Operations

The approach to operations under Arctic conditions must be positive. The advantages of the conditions present in the Arctic should be exploited to the utmost. The effects of the disadvantages must be reduced, as far as possible, or



AIR DISTANCES IN MILES IN THE NORTHERN HEMISPHERE

FIGURE 2.

even made to work against the enemy. Emphasis should be directed toward the feasibility of operations. The psychological fears and terrors, commonly associated with life in the Arctic, can be eliminated. Men have lived and continue to live in the Arctic and like it.

In Arctic warfare, task force operations of company, battalion, or regimental size will be normal. This does not preclude the possibility of task forces of division size or larger being employed in Arctic operations. The German Army operated with nine divisions under severe Arctic conditions, in Northern Finland, in an area 400 miles wide served by one railroad and three roads. The Soviet

Army used 47 divisions in winter operations against Finland in the Russo-Finnish War of 1939-40. Some of these divisions had to build their own roads under extremely difficult Arctic conditions.

Plans for the conduct of operations in the Arctic are based on existing equipment. The development of special equipment, particularly in the fields of transportation and clothing, must be emphasized in view of the future importance of Arctic operations. In the foreseeable future, special equipment will be developed by all major powers which should permit the employment of troops in the Arctic with a greater economy of force.

Principles of Operation

A commander of troops in the Arctic faces no change in the application of our tactical doctrine or principles. One can compare operations in the Arctic with desert fighting; in the sub-Arctic, with jungle operations. In the Arctic, operations take on the aspects of guerrilla-type warfare to a great extent. This implies using small units with great cross-country mobility, employing hit-and-run tactics, executing raids and ambushes, and utilizing the principles of surprise and maneuver to the maximum.

A commander's responsibilities are increased, however, by the peculiarities of the Arctic. He must learn to understand the need for and supervise the use of special clothing and equipment designed for the comfort of his men. Expedients and improvisations, incident to living and moving in the Arctic, must be exploited to the utmost. There can be no substitute for resourcefulness. As a result of his knowledge, a commander transmits his confidence, by his example, to his command.

Characteristics of Arctic Operations

Although the basic principles of combat are applicable, difficulties of terrain, visibility, and climate complicate command functions, communications, maneuver, supporting fires, logistical support, and evacuation. Arctic operations primarily are influenced by the following factors:

1. *Snow cover.*—Except for areas of deep, loose, dry snow, snow cover generally increases the possibilities of normal movement and operations of troops suitably equipped and trained, but reduces the mobility for troops lacking proper equipment or training. Snow cover makes concealment more difficult, reduces the effect of fire of all weapons, and changes the appearance and contour of the terrain.

2. *Ice cover.*—Major rivers and waterways on which shallow-draft craft may be used in the summer may become the best routes of advance and line of communications in the winter when frozen. The freezing of rivers, lakes, and swamps increases the possibilities of cross-country movement and operations.

3. *Extreme cold.*—The numbing effects of extreme cold, and the resultant increase in the need for maintenance, will slow up activities. These conditions can be reduced by proper planning, and the provision of suitable equipment, clothing, shelter, transportation, supplies, and means of evacuation. Low temperatures alone seldom will interfere seriously with troop movements, especially if the clothing and equipment are selected and adjusted properly. However, more time is consumed in getting movements underway. Low temperatures combined with winds of more than average velocity create a windchill which adds immeasurably to the chilling effect produced by subzero weather alone. This, combined with a lack of visibility resulting from blowing snow, may, at times, stop operations altogether in the Arctic. (See Figure 3.)

Another indirect result of the low temperatures which prevail is the formation

of ice fog. This is formed when moisture is released into the air at low temperatures, forming ice crystals of minute size which tend to hang in the air when little or no wind is present. Sources of this moisture are open water; human or animal vapor caused by exhalation; and combustion produced in the firing of weapons, operating internal combustion engines, or from heating apparatus. (See Figure 4.)

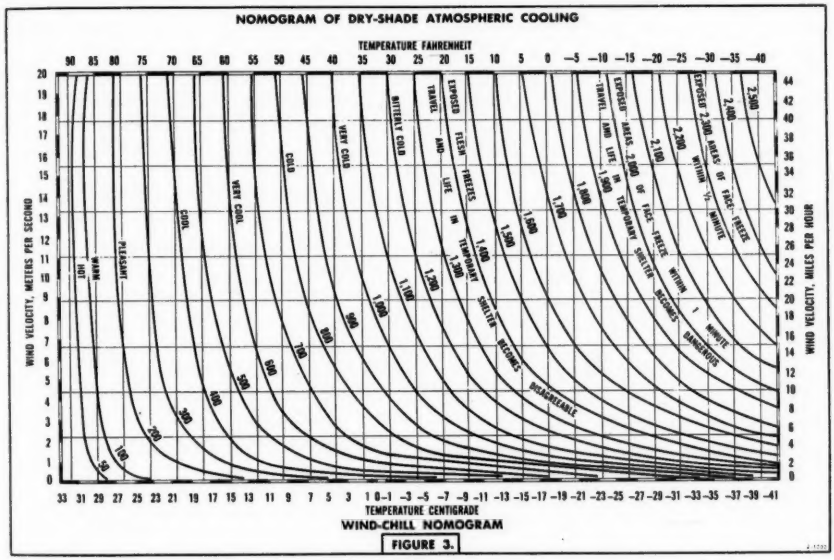

NOMOGRAM OF DRY-SHADE ATMOSPHERIC COOLING
TEMPERATURE FAHRENHEIT
90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 −5 −10 −15 −20 −25 −30 −35 −40
WIND VELOCITY, METERS PER SECOND
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
WIND VELOCITY, MILES PER HOUR
44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0
HOT
WARM
PLEASANT
COOL
VERY COOL
COLD
VERY COLD
BITTERLY COLD
TRAVEL AND LIFE IN TEMPORARY SHELTER BECOMES DANGEROUS
EXPOSED FLESH FREEZES
EXPOSED AREAS OF FACE FREEZE WITHIN 1 MINUTE
EXPOSED AREAS OF FACE FREEZE WITHIN ½ MINUTE
EXPOSED AREAS OF FACE FREEZE WITHIN ½ MINUTE
50
100
200
300
400
500
600
700
800
900
1,000
1,100
1,200
1,300
1,400
1,500
1,600
1,700
1,800
1,900
2,000
2,100
2,200
2,300
2,400
2,500
33 31 29 27 25 23 21 19 17 15 13 11 9 7 5 3 1 0 −1 −3 −5 −7 −9 −11 −13 −15 −17 −19 −21 −23 −25 −27 −29 −31 −33 −35 −37 −39 −41
TEMPERATURE CENTIGRADE
WIND-CHILL NOMOGRAM

FIGURE 3.

Cooling is expressed in kilogram calories per square meter per hour for various temperatures and wind velocities. The cooling rate is based upon a body at a neutral skin temperature of 33 degrees Centigrade (91.4 degrees Fahrenheit). When the dry cooling rate is less than the rate of body heat production, excess heat is removed by evaporation. Under conditions of bright sunshine, cooling is reduced by about 200 calories. Expressions of relative comfort are based upon an individual in a state of inactivity.

4. *Sharp variations in weather.*—Sudden changes in weather are common. These include severe frosts, mild weather, sudden freezing, snowstorms, strong winds, and dense fogs. Reliable and timely weather forecasts are essential to provide information for guarding against harmful effects and to enable tactical advantages to be gained.

5. *Daylight and darkness.*—The short days and long nights decrease the amount of daylight available for working and fighting during winter. Nights often are brightened by the moon, stars, northern lights, and reflections from snow. This increases the feasibility of surprise made possible through night movements. The short nights of the summer permit military operations throughout the 24-hour period.

6. *Seasonal transition.*—The thawing period in the spring creates special problems. The difficulties of movement increase progressively as the ice of the waterways weakens and breaks. Tempo-

rary roads and airfields disintegrate, while those of a more permanent nature may become unusable. Floods occur, and the extensive areas underlaid by permafrost become bogs in the summertime and are rendered impassable by any conventional equipment or even to troops on foot. Winter field fortifications become unusable and must be replaced by those suitable for the summer. It will become necessary to alter camouflage to conform to changed conditions. During the winter period, the main requirement for clothing is to protect against cold. In the summertime, emphasis is placed on protection against dampness and the many insects.

The freeze-up season generally is shorter and has less adverse effect upon movement. Operations involving the use of armor can best be conducted as soon as the ground and waterways freeze and before the arrival of deep snows.

Conduct of Operations

Arctic operations must be planned and conducted with a complete understanding of the variations from the normal. The effects of errors or miscalculations in planning easily might lead to disastrous results, and remedial action will, more often than not, be difficult to accomplish. The use of air transport to facilitate supply and evacuation will be essential and, in many cases, will be the only method practicable.

Main forces cannot be committed without first completing detailed reconnaissance. Emphasis on reconnaissance is directed toward the location of the enemy forces rather than the probing of soft spots or flanks. The objectives of reconnaissance include the enemy's oversnow mobility, shelter, depth of snow, and the carrying capacity of ice. Comparable with operations against guerrillas, the forces must provide security in all directions. As a conservation measure, our forces and their supplies must be transported as close to the enemy as is feasible by surface or air transport. Plans must envision the employment of a force sufficient to ensure the complete success of the initial assault. Increases in food, fuel, shelter, and clothing requirements, as well as special equipment and modified standard items, must be provided. It becomes imperative that only minimum essentials be moved. Supply economy must be achieved by careful living and self-sufficiency. The comforts provided by well-organized special service facilities and the amenities offered by rear area existences will have to be sacrificed for the necessities required for combat.

Reorganization of an Infantry Division for Arctic Combat

In the foregoing discussion, it has been established that the principles of war apply to Arctic operations as elsewhere, but that the difficulty lies in the *obstacles* to their application. Basically these problems can be resolved into those concerned with existence and the achievement of results—particularly movement. For these reasons one must consider Arctic operations as *special operations.* To solve these problems we must pay particular attention to:

1. Equipment.

2. The selection and training of personnel, to include special emphasis on motivation and morale and psychological indoctrination.

3. Logistical support, to include transportation.

The nation best prepared to cope with Arctic problems can convert these problems into relative advantages and can achieve victory. A small but determined and well-trained Finnish Army proved its worth against vastly numerically superior Soviet forces in the winter of 1939-40 because it was able to make the disadvantages of the Arctic environment work for it and against the enemy.

A commander must be guided by the

concept of providing minimum living standards for his troops consistent with maximum unit efficiency. In considering modifications to the present organization of the infantry division when it is planned to use it in the Arctic, we must approach the problem by reviewing the presently authorized equipment and personnel. In considering the equipment, we can divide that problem into that required for mobility, living, and fighting. With respect to personnel, any analysis must be made of the special characteristics of the combat and service personnel required.

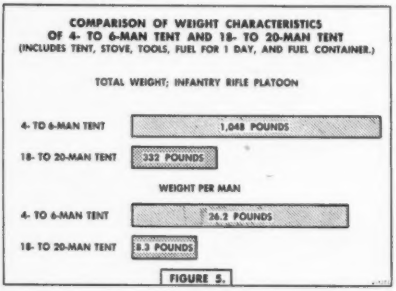
Figure 4.—Ice fog resulting from the firing of the 90-mm gun. At very low temperatures, a tank cannot adjust properly on a target, since ice fog obscures the gunner's vision.

Mobility

Mobility concerns the individual and the unit. An individual can be given excellent cross-country mobility for short distances by lightening his individual load and providing him with oversnow mobility in the form of skis or snowshoes, whereas the unit to which he belongs may not have equal facility for cross-country movement because of the nature of its larger or heavier equipment. To achieve maximum mobility, it is essential that all combat personnel be equipped with skis. While this is highly desirable for service troops, too, it is not considered mandatory. In an infantry division, under normal conditions, no additional equipment is required for the individual to provide him with cross-country mobility. Where deep snows are encountered, it is necessary for the soldier to be equipped with skis and snowshoes or both, plus all the essential appurtenances. This is an additional load already added to the increased requirements for clothing and rations.

Combat units should be provided with sufficient oversnow vehicles to transport weapons, ammunition and other supplies, shelter, and kitchens. The need for reducing the load carried by the individual and the units cannot be stressed too highly. A recent test conducted by the Joint Arctic Committee revealed the sav-

ings gained by changing the size of Arctic tents from a previously recommended 4- to 6-man tent to an 18- to 20-man tent. (See Figure 5.) Other items of equipment necessary to provide mobility for units are snowplows for clearing air strips and making and maintaining roads; cargo sleds for supplies and personnel; wanigans (small houses or shelters mounted on sleds with provisions for lighting and heating) used as mobile command posts and kitchens (see Figure 6); and ahkios (tobaggan-like sleds capable of being hand or animal drawn) used for hauling supplies and light equipment, and for the evacuation of personnel. (See Figure 7.)


COMPARISON OF WEIGHT CHARACTERISTICS
OF 4- TO 6-MAN TENT AND 18- TO 20-MAN TENT
(INCLUDES TENT, STOVE, TOOLS, FUEL FOR 1 DAY, AND FUEL CONTAINER.)
TOTAL WEIGHT; INFANTRY RIFLE PLATOON
4- TO 6-MAN TENT
1,048 POUNDS
18- TO 20-MAN TENT
332 POUNDS
WEIGHT PER MAN
4- TO 6-MAN TENT
26.2 POUNDS
18- TO 20-MAN TENT
8.3 POUNDS
FIGURE 5.

Arctic tests have indicated the feasibility of towed loads for logistical and service support. Ground transport in the Arctic should have, in addition to the military characteristics desired for operations in other regions, the following: the ability to travel over snow (low ground contact pressure), a high tractive effort over snow or ice, a good gradient ability on snow-covered slopes, a heated compartment for the protection of the vehicle operator, the ability to start easily in cold weather, and a capability for use as a source of heat for personnel and rations. An analysis of the vehicles currently provided our infantry divisions reveals that almost complete modification or substitution will be necessary to achieve cross-country mobility in the Arctic equal to that obtainable under normal terrain conditions in a less severe climate.

Living

The requirements for living under such rigorous conditions resolve into providing adequate shelter, clothing, and cooking facilities for troops. Repeated tests made by the United States and Canada, and the experiences of other nations, indicate conclusively the necessity for heated shelter to preserve the combat efficiency of troops operating in extreme cold. The transportation and erection of such shelter, however, must not detract from the mobility and combat effectiveness of the troops. It becomes necessary, therefore, to provide some means to transport shelter for the troops. This may be done by ahkio, toboggan, or sled. On this same form of transport must be carried a stove and fuel (if not locally available), together with the necessary tools to erect the shelter. Experience has shown that it takes three men to pull the transport cross country with a fourth man to act as a brake while descending hills and to assist in pulling up slopes.

A comparison in the savings in weight and combat effectiveness between the 4- to 6-man tent and the 18- to 20-man tent is reflected in the analysis provided in Figures 5, 8, and 9. Most objections to shelters larger than the 4- to 6-man tents are based on the theory that they are tactically unsound in providing the desired dispersion of men. This assumption usually is based on their presumed vulnerability to enemy artillery, mortar fire, and air attack. Simple calculations will reveal that the probability of loss due to *unobserved* fire, using either the 4- to 6-man tent or the 18- to 20-man tent theoretically is equal. Comparison, then, must be based upon *observed* artillery or mortar fire. By using the larger tent, concealment is made easier since, for an infantry

platoon, only two objects must be camouflaged rather than eight or nine. In addition, the number of tent sites to be selected is reduced greatly and only the two best locations need be used. Further, more attention can be devoted to camouflaging under these conditions. Smoke and ice fog, rising from heated tents, militates against concealment, while a reduction of three-fourths in the number of heaters is highly advantageous. Using larger shelters has the additional advantages of providing fire guards and tent security without too great a drain on combat personnel, facilitates command and control, and reduces fuel requirements.

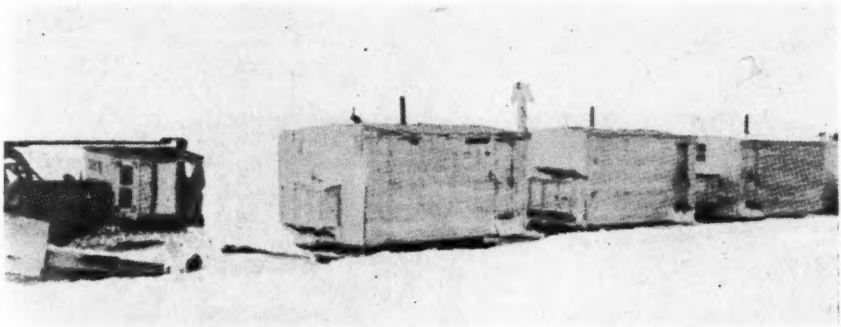


Figure 6.—Wanigans of a tractor train, Point Barrow, Alaska.

In addition to the shelter provided for troops, proper housing for command posts, kitchens, and medical and service installations must be provided if efficient operations are to be attained. Providing this shelter might well become the major problem confronting the logistical officer in the Arctic. Since most of these shelters will have to be heated, the fuel and maintenance requirements will be greatly increased. It is essential, therefore, that all troops be trained in the construction and use of emergency shelters.

Arctic clothing and equipment changes in accordance with the seasons. The great variety of individual items of clothing made necessary by Arctic operations complicates the problem of the supply officer. Included in this list of items will be articles ranging from catalytic hand warmers and mosquito head nets to sun glasses for protection from snow blindness; from ice creepers to ski wax; and from sunburn preventive cream to waterproof matchboxes—all in addition to the many special items of clothing designed for the variable climatic conditions or required for effective camouflage.

Provisions must be made for individual messing or group kitchens. Unless individual rations can be kept warm by body heat, they will freeze. Under winter Arctic conditions, it will be necessary to provide the troops with small, portable, one-burner cook stoves. The tent stove can be used for heating and preparing food which normally will consist of the canned components of the small detachment or combat-type rations. Generally, the local procurement of food will be nonexistent in Arctic areas except for the fish and game which can be used to supplement issued rations in an emergency. Unit kitchens, which provide adequate shelter for troops, are most efficient and provide greater comfort and assist morale. Their disadvantage

lies in their vulnerability to enemy attack, especially by air.

Fighting

The fighting matériel of an infantry division consists of the weapons and tactical equipment essential to accomplish its mission. Most infantry weapons are suitable, with minor modifications and winterization, for use in the Arctic. Because of the effect of extreme cold on soil trafficability, the Arctic lends itself favorably to the use of tanks. However, the sub-Arctic forests, together with the deep snows, often make the use of tanks difficult and sometimes impossible, unless they are equipped with special tracks or grousers.

Figure 7.—Towing the Ahkio.

For mobility, infantry rifle companies should be provided with one cargo carrier (an improvised version of the *M29C*) for each rifle platoon, weapons section, and company headquarters. (See Figure 10.) This is a low silhouette, full-track vehicle weighing about 5,000 pounds when loaded with the driver and three men. It provides the same general facilities as the ¼-ton truck. Each company should be provided with one *Snowmobile*, Canadian, *Mark II*, to be used for supply and for towing a mobile kitchen. (See Figure 11.) This is an enclosed-cab, full-track, low ground pressure, oversnow vehicle with a fabricated aluminum and plywood cab and superstructure. When towing sleds or wanigans, its load capacity is similar to that of a 2½-ton truck. A newer development, the *Otter*, appears to meet the requirements for the oversnow mobility required by a platoon. Wheeled vehicles have limited application in the Arctic, except where roads can be cleared by snowplows or packed down by tracked vehicles. Reliance must be placed on tracked, oversnow vehicles and even these are rendered road bound during the spring thaws in the areas of the tundra.

The employment of artillery in the Arctic creates abnormal problems. Impact bursts of high trajectory artillery or mortar fire are rendered relatively ineffective because of the cushioning effect of deep snow. This favors the employment of the proximity or mechanically timed fuzes in air burst and overhead fires. The 60-mm mortars, with which the present infantry division is equipped, have practically no effect in deep snow. A replacement of these weapons in each rifle company with two 81-mm mortars would provide a more effective burst. However, this substitution would reduce the mobility of the company. For this reason, a careful analysis must be made before proposing such changes because the conflicting requirements of mobility and fire power must be balanced. The oversnow mobility of artillery may be increased by reorganizing some artillery units into recoilless rifle or heavy mortar elements. The limitations of artillery, road bound in deep snow conditions, can be overcome somewhat by the maximum exploitation of its range capabilities. The use of larger calibers is indicated for maximum range, but, here again, a decrease in mobility then must be accepted plus the added problem of ammunition supply. For these reasons, the use of light or medium self-propelled artillery appears most feasible and will provide maximum flexibility. The problem of ice fog, incident to the firing of artillery, was discussed previously under the effects of extreme cold.

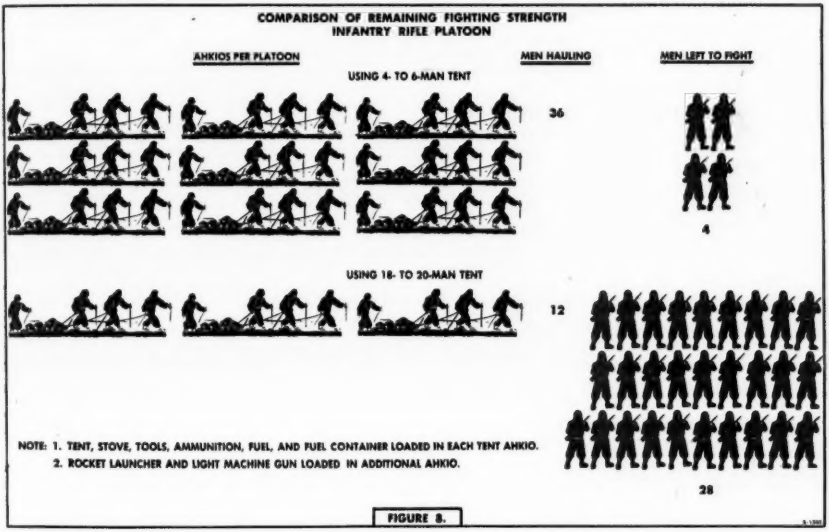

COMPARISON OF REMAINING FIGHTING STRENGTH
INFANTRY RIFLE PLATOON
AHKIOS PER PLATOON
MEN HAULING
MEN LEFT TO FIGHT
USING 4- TO 6-MAN TENT
36
4
USING 18- TO 20-MAN TENT
12
28
NOTE: 1. TENT, STOVE, TOOLS, AMMUNITION, FUEL, AND FUEL CONTAINER LOADED IN EACH TENT AHKIO.
2. ROCKET LAUNCHER AND LIGHT MACHINE GUN LOADED IN ADDITIONAL AHKIO.

FIGURE 8.

Personnel

Whether or not personnel should be specially selected for Arctic operations is a subject for considerable discussion and on which there is divided opinion. On the basis of the full utilization of manpower in the event of total mobilization, special selection is uneconomical and may lead to an unbalanced manpower reserve. On the other hand, everything, including the selection of personnel, should be done to ensure the success of an operation.

Reports from Task Force *Frigid* and Exercise *Yukon* indicate that the preselection of personnel would be desirable if

for no other reason than to eliminate those individuals who are predisposed to cold injury or who have personality problems. The most important criteria for preselection for Arctic operations is that the individual be able, physically, to perform his assigned job in the Arctic. The United States Navy Civil Engineer Corps publication, *Cold Weather Engineering*, 1948-1949, states, "It is not to be construed that survival in the Arctic requires a type of superman, because experience has shown that any individual who is physically and mentally capable of adjusting to military life anywhere overseas is also able to adjust to life in the Arctic. The adjustment, however, requires indoctrination and motivation."

Various broad categories for preselection have been studied which would consider personnel who were reared north of the 42d Parallel, those with an outdoor background, or individuals reared outside large cities as being especially well adapted for assignment to forces destined for Arctic operations. Such preselection criteria appear unjustified, and they may deprive units of men whose other qualifications are highly desirable. Emotional stability assumes greater importance for troops operating under Arctic conditions. The presence of more morale inhibiting factors, and the absence of morale stimulating activities, will tend to increase the losses in personnel and necessitate special emphasis on psychological indoctrination, leadership, and motivation of the individual. The feeling of loneliness brought on by the absence of cultural features, inhabitants, and industry; the depressing effect of long winter nights and the deathly silence that accompanies dropping temperatures; and the feeling of being isolated because of the long distances from built-up areas increases greatly the problem of maintaining morale. The necessity of living in closely confined conditions also must be considered.

Arctic training and acclimatization will serve to eliminate many who are found lacking in the necessary physical qualifications. A training period of 12 weeks, under Arctic conditions, should suffice to eliminate most of those who, by their re-

OPERATION PERFORMED	4- TO 6-MAN TENT		18- TO 20-MAN TENT (PROPOSED)	
	Calculations	Man-hours	Calculations	Man-hours
Striking and loading	8 tents X 5 men X 0.5 hours.	20.0	2 tents X 5 men X 0.5 hours.	5.0
Hauling	9 ahkios X 4 men X 6.7 hours.	241.2	3 ahkios X 4 men X 6.7 hours.	80.4
Clearing tent site	8 tents X 5 men X 0.3 hours.	12.0	2 tents X 5 men X 0.5 hours.	5.0
Erecting tents	8 tents X 5 men X 0.5 hours.	20.0	2 tents X 5 men X 0.5 hours.	5.0
	TOTAL MAN-HOURS	293.2	TOTAL MAN-HOURS	95.4
Percent of total available manpower consumed for march		91.6		29.8

Figure 9.

tention, would create a burden on the force beyond their potential value.

Replacements intended for units engaged in Arctic operations must be acclimatized and trained for the Arctic. Un-

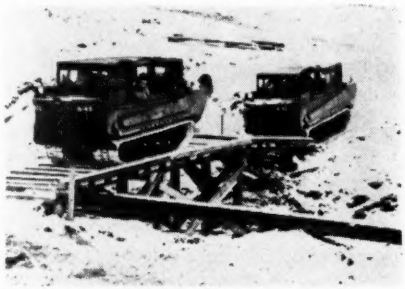


Figure 10.—Carrier, cargo, *M29C* (*Weasel*).

qualified replacements soon will become casualties, and a greater burden than an aid. Facilities to conduct replacement training should be located in an area which will simulate Arctic conditions.

Since the tactical mission in the Arctic is the same as in any other climate, no change in the number of riflemen in an infantry company should be considered. If more riflemen are required to perform a mission, that increase should be effected by the addition of units. Control, as in jungle operations, is difficult to achieve, and increasing the number of riflemen within units merely magnifies the problem. On the other hand, a decrease in the number of riflemen should not be considered because of the need of fire power of this most mobile weapon of the infantry. One also must bear in mind that the changes made in subordinate units have a corresponding effect in larger units, and this "snowballing" effect must be avoided. One suggested modification in the Tables of Organization and Equipment is the addition of one medical aid man for each squad because of the need for the immediate evacuation of casualties in extremely cold climates. If a squad member is used for this purpose, the squad is depleted by two each time a casualty occurs.

The number of service troops to accomplish service support tasks increases under Arctic conditions. This is due to the fact that service requirements increase while the individual capacity for doing work decreases in the Arctic.

In Arctic operations, all troops—both service and combat—must be prepared to fight at all times. More time and greater care must be taken in their training to ensure that all service troops are capable of defending their installations. When faced with a shortage of personnel, transportation, or both, serious thought must be given to using infantry-trained replacements in service jobs that do not require a high degree of technical skill. In addition to performing a service function, these troops will provide a reserve for the defense of logistical installations and a pool for the replacement of combat losses.

Summary

One must conclude from the foregoing

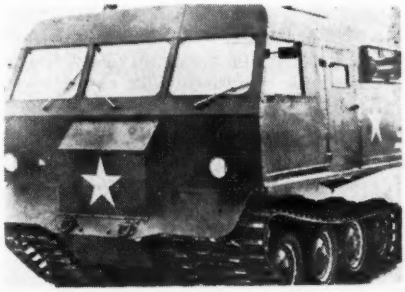


Figure 11.—*Snowmobile*, Canadian, *Mark II (Penguin)*.

that military operations in the Arctic and sub-Arctic are feasible with little modification in our present infantry division organization. Its mobility will have to be increased by the use of skis, by reducing the loads carried, by using tracked ve-

hicles of low bearing pressures pulling towed loads, and by the use of light self-propelled artillery.

Our basic combat principles are sound and their application is affected only by the adverse conditions found in the Arctic.

The problems of morale are accentuated under Arctic conditions. Commanders and staff officers must recognize the problems of Arctic operations. They must use every available means and demonstrate real leadership so as to accomplish their mission successfully with a maximum economy of force and supply.

Thus can the Arctic be our ally, for the nation which provides its troops and equipment with mobility, which trains its personnel properly, and which can motivate its troops adequately need not fear the Arctic.

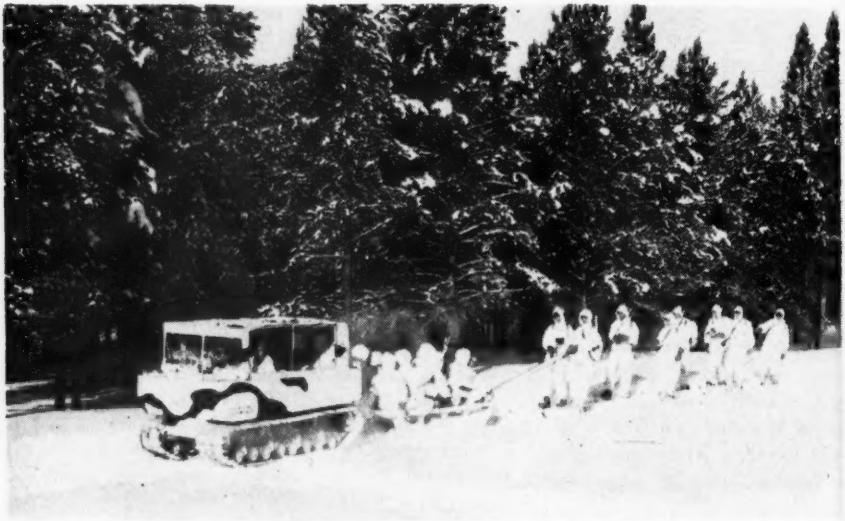


Figure 12.—Tractor train.

Only by mutual aid and encouragement can forces be constructed among the free peoples of the world of such capacity that we can clearly discourage a would-be aggressor, or decisively defeat him should he plunge the world into war.

General J. Lawton Collins

Clearing Companies Can Do Holding

Major George T. Britton, *Medical Corps*
Division Surgeon, 7th Infantry Division

The views expressed in this article are the author's and are not necessarily those of the Department of the Army or the Command and General Staff College.—The Editor.

THIS article describes the use of an Army medical clearing company (separate) in lieu of an Army medical holding company in Korea. The general principles involved and the potential of various types of medical units to discharge unusual missions as field expediencies when required are important for commanders and logistical planners.

Evacuation of casualties presents many problems, including the method employed for the holding of the individual noneffective at intermediate points while awaiting transportation. This problem is ever present, whether the means of transportation be by air, sea, or land. Treatment instituted in the forward areas must be continued and augmented by all medical agencies in the chain of evacuation.

The unit which receives and holds casualties at the airfield, seaport, or rail terminus is termed a holding unit. It must be organized and equipped to continue specialized service to the patient during the period he spends therein, prior to the departure of evacuation transportation. Because of the relative sensitivity to weather on the part of air transport, the holding unit at airfields must have the most flexible capabilities. Although there is a specialized Army unit, known as the Medical Holding Company (Table of Organization and Equipment 8-57), for this mission, other medical treatment facilities frequently must undertake this task. This has been the case in Korea.

The 629th Medical Clearing Company (Separate) has had the mission of operating as a medical holding unit at various forward airfields in Korea. Army clearing companies (separate) are particularly suitable for expediting air evacuation in the forward areas. Although various types of medical units, such as gas treatment battalions and field hospitals, have been used in this capacity in the past, certain features of the Korean operation, in which this clearing company participated, justify description.

Most of the aircraft used in air evacuation between the combat area and the hospitals to the rear are double-duty planes. They lift in cargo of various kinds and carry back patients. It is important that there be a minimal delay at either end of the flight. A clearing station at the forward air strip is helpful to hold patients pending arrival of planes and to assist in loading.

Because of its organization, clearing companies are useful as holding units to evacuate patients from forward areas. This is an example of field improvisation, important to commanders and logistical planners

Company Organization

A clearing company (separate) consists of three platoons capable of separate activity. Each platoon has 2 doctors, 1 warrant officer, and 31 medical soldiers. To each platoon, when it operates independently, may be attached a motor mechanic and 4 cooks from the company headquarters. The platoon has sufficient insectproof hospital tentage to hold 150 patients for any necessary length of time, and 250 patients for periods of up to 24 hours. There are enough stoves and bedding to ensure comfort in cold weather, and professional equipment for all forms of treatment required. With its own intrinsic transportation and simplicity of equipment, the platoon is able to pack rapidly and move as necessary.

Two to four ambulances from an Army ambulance company augment the platoon in this type of mission. These are utilized in transporting patients from the clearing station to the plane on the air strip. Occasionally, when weather prevents use of the air strip, they are used to transport patients to an all-weather airfield farther to the rear.

Platoons may be employed alone at air strips or may be combined for greater capacity according to the expected casualty load. In support of a defense in depth, the three platoons of one company may be placed at various air strips, in echelon, and may leapfrog each other, forward or backward.

The company headquarters is so organized that it can join that platoon which is the most active, to supervise the receipt and issue of supplies, the evacuation of patients, and to publish a daily Admission and Disposition Report. In Korea, patients are cleared from many medical sources. They represent United States personnel of all three services, other troops of the United Nations, and prisoners of war. The daily Admission and Disposition Report presents a fairly comprehensive picture of the activity in the entire area. A nightly telephone report to the Corps Surgeon informs him of the casualty load.

Procedure

All patients handled by a clearing station are examined by a medical officer. Appropriate treatments are continued and entries made on the clinical records. Patients are sorted by the medical officers so that the most critical patients are evacuated before those less seriously ill. Patients who have recovered may be returned to duty on the clearing company's special order.

The Geneva Red Cross symbol is displayed prominently on ambulances and on the tops of all tents. In addition to satisfying the requirements of the Geneva Convention, this serves as a guide for evacuation helicopters and planes. An Air Force liaison noncommissioned officer is attached informally to each platoon evacuating patients. He orders the planes required each day and co-ordinates their loading.

Location

The most common location for a clearing platoon used for air evacuation is in the vicinity of a mobile army surgical hospital. The platoon increases the capacity of the hospital by taking patients already treated and relieving the hospital of all evacuation responsibility. This increases the mobility of the surgical hospital, and permits its use closer to the front.

Patients normally are evacuated by air to field hospitals, evacuation hospitals, station hospitals, or hospital ships. However, when a clearing platoon is employed on an air strip forward of the mobile surgical hospital, the sorting of patients must include the evacuation of all surgical cases, by ambulance or helicopter, to the mobile surgical hospital.

There have been several incidental ad-

vantages that have accrued because of the utilization of a clearing platoon as a holding unit. The platoon may serve as a base for the widespread activities of a preventive medicine detachment; as a collection point for laboratory specimens awaiting air courier; as mess and motor support to an advance medical supply point; as a medical processing point for personnel leaving Korea by plane; as an installation for sick call for isolated detachments in the neighborhood; and as an emergency hospital in case of ambush, air attack, or plane accident.

Problems

The problems encountered have been relatively few in number. Some worthy of particular mention are:

1. With poor flying weather, the patient load becomes heavy. It may become necessary to evacuate by ambulance or else provide additional holding space.

2. With several air evacuation planes on the ground at the same time, it becomes necessary to borrow extra litter bearers from nearby units.

3. Since there is no property exchange on aircraft performing double duty as air evacuation planes, bulk quantities of blankets and litters must be maintained by the holding unit.

4. Korean interpreters are essential. Interpreters for the other languages of the United Nations' forces present would be helpful.

5. Although *C-47* planes dispatched for air evacuation carry a medical airman, it is often necessary for the clearing platoon to furnish an extra attendant for serious patients. Similarly, an attendant must be furnished for each cargo plane commandeered to carry patients. Since the plane's next trip is usually to a different air strip, these attendants have to find their own way back to the clearing platoon by air "hitchhiking."

6. Advance planning, leading to better arrangements between the organization operating the air transports and the holding unit, must be undertaken. When first arriving at a forward air strip, the platoon often finds no Air Force personnel and no communications facilities. The division or the corps troops operating the field have had no prior connection with evacuation, and it is difficult to obtain the required planes during the first few days, or until an Air Force cargo office is established. Communicating through higher headquarters to order planes takes additional time, and taxes telephone connections not yet well established.

A clearing platoon stationed on a small forward air strip often can evacuate patients by *C-47* to another clearing platoon on a larger air strip. This allows for the rapid removal of casualties from the forward area, and permits the patients to be sorted more accurately before being transported farther back by *C-54*.

A clearing platoon may be employed also at a railhead as a holding company, where it assists in the loading of hospital trains. However, railheads always may not be convenient to the evacuation chain.

Summary

Because of its elastic organization, a clearing company (separate) is useful as a medical holding unit at an airhead to expedite the evacuation of patients. When used in co-operation with a mobile army surgical hospital, it relieves the hospital of evacuation responsibilities, and increases its capacity and mobility.

A Golden Opportunity

Colonel Irving D. Roth, *Artillery*
Instructor, Command and General Staff College

WHO wants to command a division or be on a general staff?

Sometimes it appears that everyone "wants on the staff," and it may well be so. However, the question then arises, is everyone trained or does he have the necessary experience for assignment to high command or staff duty? What is the procedure for obtaining such training or experience?

As a result of the experiences of World War II, and the recommendations of the Eddy and Gerow Boards, the opportunities for higher military education and training have been simplified and expanded. For Regular Army officers, there is a well-developed program to provide this training, that is, the Regular Course at the Command and General Staff College. Even though this course can accommodate only 50 percent of all the officers in the Army, the program is sufficient if we consider only our peacetime needs. However, that is not our basic problem. This article will deal with the programs which have been established under the direction of the Army Field Forces for the education and training of officers of the National Guard and the Organized Reserve Corps who will be needed for full-scale mobilization.

What was the size of the Regular Army in 1933? To what extent did it expand between 1933 and 1939? What was its final size at the end of World War II? Were there trained, experienced officers available in 1939 for assignment to the many staff positions required for the full-scale mobilization? The answers to these questions will give some clue to the reasons behind our present programs.

In 1933, numerically, our Army was at its lowest ebb since World War I. It consisted of some 118,000 officers and enlisted men. By 1939, the Army had reached a strength of approximately 175,000. At the end of the war, in 1945, our Army was at its peak strength with a force of approximately 8½ million. About 900,000 were commissioned officers. Our educational program, prior to World War II, was not adequate to provide the vast numbers who were needed for staff assignments. To alleviate this condition during the war years, the courses of instruction at the Command and General Staff College were shortened, and larger classes were enrolled for each of the short courses. This, however, could not make up for the lack of a backlog of trained and experienced officers who would be readily available for assignment to high command and general staff duties at the time they were needed.

Prior to World War II, we did not have a comprehensive program of instruction available to fit National Guard and Organized Reserve Corps officers for command or general staff assignments. Had there been such a program, there would not have been such a large number of officers who, without any previous training

or experience, found themselves assigned to positions of great responsibility.

Source of Manpower

This sketchy introduction leads to an examination of the steps now being taken to provide a sizable backlog of trained officers who will be available to fill the additional staff positions in the event of full-scale mobilization. At present, large numbers of officers with World War II experience in combat are available. They provide a most valuable source from which to select officers for this training. There is a large, revitalized National Guard and a well-balanced Organized Reserve Corps. The majority of the officers in these two components have the necessary military background to permit them to pursue profitably courses of instruction which will fit them for general staff duty or for high command. This, then, is the source of manpower. The next problem is to investigate the program for training this manpower.

Training Programs

There are two programs currently being conducted. One of these programs deals with the training of individuals *as individuals*; the other is concerned with the training of individuals as members of organized units.

In the program conducted for individuals as individuals are the Special and Regular Associate Courses, Command and General Staff. The purpose of both these courses is to prepare qualified officers for duty on the general staff at the division level, or for duty as division commanders.

Figure 1 is a graphic representation of the program of instruction prescribed for the Special Associate Course. Further details of the methods of presentation of this course will be discussed, in detail, in later paragraphs.

The scope of instruction in the associate courses must, of necessity, be quite broad if it is to accomplish the mission and to fulfill the announced purpose. Included in their scopes are the organization, equipment, and tactical employment of units organic to the division; and the tactical employment of infantry, armored, and airborne divisions, and their administrative, intelligence, and logistical support. The courses are progressive in nature. Included in the instruction are such subjects as the air support for the three types of divisions, and the infantry division in special operations to include the attack of a fortified position, a night attack, a river crossing, an amphibious operation, an arctic problem, and mountain operations.

The subjects are *not* designed as staff problems to be solved from the viewpoint of the general staff officer having primary interest, but are prepared and must be solved from the viewpoint of the division commander. All problems are planned to demonstrate how the commander employs his general staff as a co-ordinating group to assist in the exercise of command. Only sufficient instruction in the duties of the special staff is included to give the commander and general staff an appreciation of their capabilities and limitations. The basis for this conception is the fact that instruction in the duties of the special staff officer is provided by courses conducted by the several branch schools.

In the light of the stated purpose of these courses, no tactical or logistical

Based on the experiences of WW II, opportunities for higher military education and training have been simplified and expanded so as to provide that backlog of experienced officers required for full mobilization

problems at the level of the corps are included. However, the relationship of the division to the field army, from the logistical standpoint, is developed.

As was stated earlier, the courses are progressive in nature. To keep all student officers abreast of the times, the courses include all the latest concepts on leadership and trends in warfare which may affect present doctrine, tactics, or techniques.

Prerequisites for Attendance

The story is told that General Grant kept an officer on his staff whose primary duty was to read all orders prepared by the other members of his staff. If this officer could understand the order, it was accepted as being understandable by anyone, and it was then promulgated to the command.

It is essential that each staff officer be able to translate the commander's decisions into clear, unmistakable orders. Therefore, to obtain the best qualified officers, prerequisites have been established for enrollment in each of these courses. The prerequisites for the two courses differ, since the method of presentation and the subject matter included are somewhat different. The general prerequisites which are applicable to both courses include such things as age, former schooling, and source from which the officers may be chosen. Prior length of service required for enrollment in the Regular Associate Course has been set at 8 years, and for the Special Associate Course at 7 years. All Regular Army, Category III, National Guard, or Organized Reserve Corps officers are eligible for either course. However, an additional requirement, which states that candidates must be selected from among the highest rated officers otherwise eligible, limits the number who may be chosen for enrollment.

It is essential, for selection of either course, that the officer has completed his branch advanced or associate advanced course, or have constructive credit therefor. A special provision is made for officers enrolling in the Special Associate Course. These officers may, in lieu of the above requirement, complete the extension-course subcourse of his branch, in the 40 or higher series, appropriate to his grade.

In addition, to be selected for either course, the officer must have demonstrated, by actual performance of duty, a potentiality for assignment to high command or staff duty.

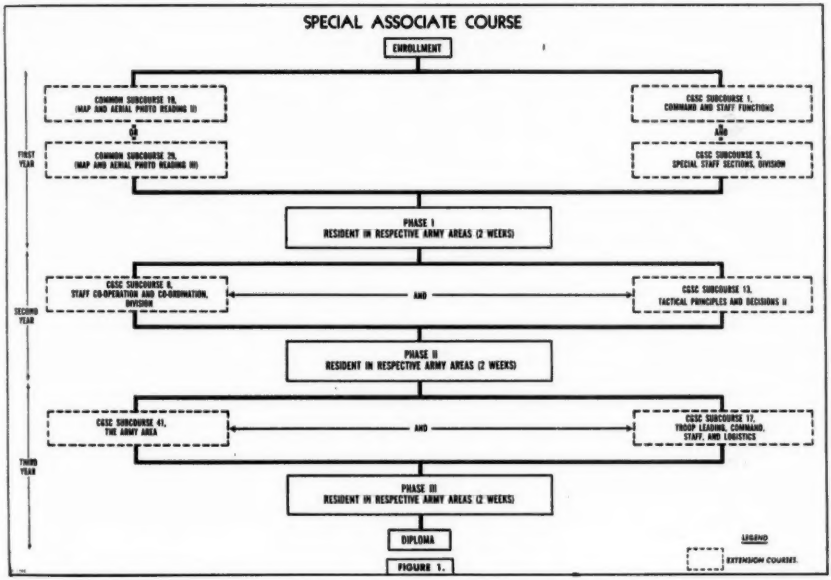
Here, the similarity between the two courses ends. In order to enroll and remain in the Special Associate Course, additional prerequisites in the form of extension-course requirements have been established. The sequence of taking these extension-course subcourses and the resident instruction, together with a statement of these requirements, is shown graphically in Figure 1.

The method of instruction in the two courses is quite different. The Regular Associate Course is a resident course of approximately 13 weeks conducted at the Command and General Staff College. Instruction is continuous over the period and, in general, follows the same procedures as those for the Regular Course at the Command and General Staff College.

Special Associate Course

The present Special Associate Course, Command and General Staff, established in 1949, is the successor to a similar course, since discontinued. As indicated in Figure 1, this course is a combination of extension-course and resident instruction. The extension-course requirements consist of about 155 hours of home study and the resident instruction is composed of 6 weeks of progressive instruction presented in three 2-week periods (phases), approximately 1 year apart, in the several army areas. Each 2-week period contains about 72 hours of classroom work, with an appropriate study assignment. In each of

the three phases, a final examination is given and, upon successful completion of the prerequisites and the resident instruction in Phases I and II, a certificate is awarded by the army commander. Upon completing *all* prerequisites and Phase III successfully, a diploma is awarded by the Commandant, Command and General Staff College, through the appropriate army commander.


SPECIAL ASSOCIATE COURSE
ENROLLMENT
COMMON SUBCOURSE 19, (MAP AND AERIAL PHOTO READING II)
COMMON SUBCOURSE 29, (MAP AND AERIAL PHOTO READING III)
CGSC SUBCOURSE 1, COMMAND AND STAFF FUNCTIONS
AND
CGSC SUBCOURSE 3, SPECIAL STAFF SECTIONS, DIVISION
FIRST YEAR
PHASE I RESIDENT IN RESPECTIVE ARMY AREAS (2 WEEKS)
CGSC SUBCOURSE 6, STAFF CO-OPERATION AND CO-ORDINATION, DIVISION
AND
CGSC SUBCOURSE 13, TACTICAL PRINCIPLES AND DECISIONS II
SECOND YEAR
PHASE II RESIDENT IN RESPECTIVE ARMY AREAS (2 WEEKS)
CGSC SUBCOURSE 43, THE ARMY AREA
AND
CGSC SUBCOURSE 17, TROOP LEADING, COMMAND, STAFF, AND LOGISTICS
THIRD YEAR
PHASE III RESIDENT IN RESPECTIVE ARMY AREAS (2 WEEKS)
DIPLOMA
LEGEND
EXTENSION COURSES.
FIGURE 1.

Courses are provided which will best accomodate the needs of the officers in the specific army area. The exact location and time of presentation of this resident instruction is as prescribed by the respective army commanders. In some army areas, more than one course in each of the three phases is conducted, and, in some instances, at more than one location. In order to determine where and when these courses are to be conducted, the officer concerned need only contact his unit instructor or the chief of his military district. Administrative procedures for enrollment are decided upon by the respective army commanders, and may differ in each army area. Once again, the unit instructor should be contacted.

Although Figure 1 indicates that the course is covered in 3 years, no minimum time has been established. The only provision is that *all* prerequisites must be completed successfully before a diploma will be awarded. It is anticipated that the course will be completed in 3 years, but where cogent reasons exist, the period involved may be more than 3 years by postponing the taking of the second or third phase, but not both, for 1 year from the time it would be taken normally.

Organized Reserve Corps Program

The associate courses have been covered briefly. One other course provided for individuals now will be considered. This is a 3-year planned program in the Organized Reserve Corps Schools. Its purpose and scope are similar to the Regular and Special Associate Courses, and many of the same subjects are included. How-

ever, there are no comparable, definite prerequisites established for this program. It is conducted in the several army areas under the supervision and guidance of the continental army commander, the military district commander, and the Unit Organized Reserve Corps instructors. Approximately 2 hours of instruction are presented each week, for 24 weeks a year, in addition to a 15-day active duty period. This instruction primarily is established for Organized Reserve Corps officers who are not assigned to units. While there are no examinations, and no formal certificates or diplomas awarded now for the successful completion of the program, a proposal has been made that where the Organized Reserve Corps course has been declared the academic equivalent of a comparable resident associate course, a similar diploma be awarded for its successful completion. At present, there are about 120 Organized Reserve Corps Schools established throughout the United States, with an enrollment of about 3,000 students in the Command and General Staff Course.

The course of instruction for the Organized Reserve Corps Schools is a planned 3-year program, progressive in scope. The first year essentially is a coverage of the basic fundamentals of combat. It is phased progressively so that in the third year, special operations of the division are covered.

SUMMARY OF PROGRAMS

PROGRAM	DURATION	LOCATION	ELIGIBILITY
	INDIVIDUAL TRAINING PROGRAMS		
1. Regular Associate Course	Approximately 13 weeks	Command and General Staff College	Regular Army, Category III, and selected National Guard and Organized Reserve Corps officers.
2. Special Associate Course	3-4 years	Army areas	Regular Army, Category III, and selected National Guard and Organized Reserve Corps officers.
3. Organized Reserve Corps Schools	3 years	Army areas	Organized Reserve Corps officers not assigned to units.
	UNIT TRAINING PROGRAMS		
4. National Guard Division Staff Training Program	Indefinite	Army areas	National Guard officers assigned to National Guard divisions.
5. National Guard Division Refresher Course	1 week	Command and General Staff College	National Guard officers assigned to National Guard division staffs.
6. Organized Reserve Corps Division Staff Training Programs	Indefinite	Army areas	Organized Reserve Corps officers assigned to Organized Reserve Corps divisions.
7. Organized Reserve Corps Division Refresher Courses	1 week	Command and General Staff College	Organized Reserve Corps officers assigned to Organized Reserve Corps division staffs.
8. Logistical Command Refresher Courses	1 week	Command and General Staff College	Officers assigned to logistical commands.

FIGURE 2.

Unit Training

The foregoing completes a discussion of the individual programs for training of National Guard and Organized Reserve Corps officers in staff procedures and techniques. The second group of programs is that devoted to unit training. There are, in general, two such programs. The first includes the National Guard and Organized Reserve Corps Division Training Program, and, the second, the Refresher Courses. The Division Training Pro-

grams are conducted in the several army areas, whereas the Refresher Courses are conducted at the Command and General Staff College.

The material for the National Guard and Organized Reserve Corps Division Training Programs is identical with that provided in the Organized Reserve Corps Schools for individuals. The difference between these two courses is in the manner of presentation. For the Division Programs, the instruction is under the supervision of the division commander, and he is allowed great freedom in the selection of the instructional material to be covered. There is no definite planned program of instruction. However, it is recommended strongly that the divisions follow, as closely as possible, the schedule laid down for the Organized Reserve Corps Schools. By so doing, the maximum benefit will be derived from the program.

A typical classroom scene at one of the Special Associate Courses (Phase I, 2-weeks duration) conducted at the Command and General Staff College, Fort Leavenworth, Kansas.

Refresher Courses

The final group of courses to be discussed are the Refresher Courses. These 1-week courses are presented at the Command and General Staff College each year for the commanders and staffs of the National Guard and Organized Reserve Corps divisions, and for the logistical commands. The courses provided for the National Guard and Organized Reserve Corps divisions have as their purposes the opportunity for 1 week of integrated training for the division staffs; a review of the current organization (division only); a review of general staff doctrine and recent developments; and the stressing of current changes; a review of general staff doctrine and recent developments; and a review of current tactical doctrine with a consideration of the impact of new weapons and trends in warfare upon organization, technique, and doctrine.

The purpose of the Logistical Command Refresher Course is to assist in the training of logistical command staffs by a review of the organization and functions of

the three type logistical commands. It has as a further purpose the same general considerations as for the National Guard and Organized Reserve Corps Refresher Courses.

Figure 2 summarizes the programs for command and staff training currently being carried out under the supervision of the Chief, Army Field Forces.

Instructional Material

It would not be appropriate nor desirable to leave this subject without a short discussion of the instructional material provided in the various programs. All material, except the subcourses of the extension courses of the branch schools, is prepared at the Command and General Staff College, using, as a basis, the material presented to students in the Regular or Associate Courses. One of the instructional departments of the Command and General Staff College supervises the preparation, assembly, and distribution of this material, as well as the activities of the Extension-Course Section in the preparation of all such courses prepared at the College. It co-ordinates the selection of the extension-course prerequisites found in the Special Associate Course. This department also is charged by the Commandant, Command and General Staff College, with the responsibility of making staff visits to the army areas where resident instruction, in the various phases of the Special Associate Course, is being given.

Conclusion

No man is, or has been, perfect. Mistakes of omission and commission in the training of officers for staff duty were prevalent prior to World War II. These mistakes were recognized and, as a result, the Department of the Army established, within our military education program, a comprehensive schedule for the training of officers of all components in command and staff procedures and techniques. If this program is given the wholehearted support of all officers, it will ensure a trained and experienced backlog of officers eligible and qualified for assignment to command and general staff positions.

Who wants on the staff? Once again, everyone may "want on the staff," but only if each army commander, Organized Reserve Corps division commander, National Guard division commander, military district commander, and each individual National Guard and Organized Reserve Corps officer pushes this program to the limit will the requisite numbers of officers who will be needed for mobilization assignments to general staff positions be available and ready to do the job.

There is a vast difference between being a staff officer and being a commander. The staff officer is never totally responsible—the commander always is. For that reason, although a good commander usually will make a good staff officer, the opposite is not necessarily true.

General J. Lawton Collins

ARMOR IN PURSUIT

Colonel John K. Boles, Jr., *Armor*
Instructor, Command and General Staff College

9/3

IT HAS been said that pursuit is the crown of victory. When a defeated enemy attempts to withdraw from the battlefield and is not pursued immediately, only half a victory has been won, but when victory on the battlefield is crowned by a successful pursuit, the enemy indeed can be destroyed. The destruction of the enemy always has been the goal of the commander in the field, but, during some periods of warfare, the ability to achieve this goal sometimes was limited.

During the twelfth and thirteenth centuries, the ability to pursue and destroy the enemy was limited greatly by the castles and walled cities in which the defeated troops were able to seek refuge. Defense and siege warfare ruled the battlefield until gunpowder reduced the effectiveness of fortresses. Because defeated forces thus were robbed of their sanctuaries, cavalry in the hands of the victor once more became the decisive element on the battlefield, the element which enabled the victor to annihilate his foe instead of merely defeating him.

About 1870, tactical mobility again began to decline and, when World War I was being fought, the God of War found himself shackled to the battlefield by barbed wire and imprisoned in the trenches by machine-gun fire. The glorious days of the cavalry and rapid movement, of mounted charges and pursuits, were rapidly drawing to a close. In their place, we had stabilized fronts, hundreds of miles of trenches protected by barbed wire and machine guns. If an attack was successful, the defeated soldiers merely withdrew into another line of trenches. Because of a lack of mobility, victories were not followed by pursuits, and, consequently, the defeated enemy was pushed back instead of being encircled and annihilated. Then came the tank, the answer to the barbed wire, the machine gun, and stabilized warfare. Initially, the potentialities of armor were slow in being exploited and, during the balance of World War I, tanks were used on small-scale local attacks, primarily as an infantry support weapon.

Between World Wars I and II, some farsighted individuals saw in armor the rebirth of cavalry. Armor was not to be kept tied to the apron strings of the "Queen of Battle"—the infantry—but was to restore to warfare the mobility which it had lost when the development of longer range weapons, with greater fire power, figuratively and literally shot the horses out from under the mounted troops. Once again the victor could outdistance his fleeing foe, cut the routes of retreat,

Pursuit is the crown of victory. A battle won without pursuing the enemy is only a half victory, for the goal of the commander in the field has not been achieved—the annihilation and destruction of the enemy

and destroy the disorganized and demoralized troops before they could recover from their initial reverses.

The same basic principles of pursuit which served Hannibal, Caesar, and Napoleon so well were to apply to armor. Armored units are particularly well suited for pursuit missions because of their equipment, organization, and training, which combine to give them armor-protected fire power with great independent mobility. This tactical and strategic mobility is the chief characteristic of armor which permits it to become the keystone around which plans for a pursuit are built.

Principles of Armored Pursuit

The object of armored pursuit is the annihilation of the hostile forces. This seldom can be accomplished by a straight pushing back of the hostile forces on their lines of communications, as was attempted by the allies in World War I. It can be accomplished most effectively by combining direct pressure with an encircling maneuver. Armored units, employing their mobility, must be utilized to envelop one or both flanks of the enemy in order to block the routes of retreat, while a direct pressure force keeps the enemy fully involved. After the retreating column is halted, the enemy then is crushed between the direct pressure force and the encircling force.

The military forces of some countries teach that there are three types of pursuit:

1. Frontal pursuit by direct pressure force only.

2. Parallel pursuit engaged in by an encircling force only.

3. Combined pursuit, a combination of 1 and 2 above.

As previously indicated, our doctrine considers only one form—the combined pursuit. If the escape routes are not cut by an encircling force, the attempted pursuit may well result in the victor only nibbling at the heels of the withdrawing rear guard. The weakness of considering the frontal form of operation as a type of pursuit, instead of realizing that it is only a part of the pursuit maneuver, is best illustrated in Rommel's final movement west across North Africa.

El Alamein to Tunis

Montgomery's pursuit of Rommel, from El Alamein to Tunis, has been regarded by many as the classic example of a successful pursuit. In this action, the British Eighth Army, after winning the battle of El Alamein, made a spectacular 1,500 mile march in pursuit of more than 240,000 Germans and Italians. Frequently, it engaged the rear elements of the enemy in action and several times forced the main body out of defensive positions, but it failed to *cut off* and *destroy* the enemy. Although the maneuvering forces six times attempted to encircle the enemy and cut the line of retreat of the main body, all efforts failed because of the difficult terrain, unfavorable weather, and the superb evasive tactics of Rommel. Instead of being the acme of pursuit, it more accurately may be considered a remarkable example of the successful evasion of a pursuing force.

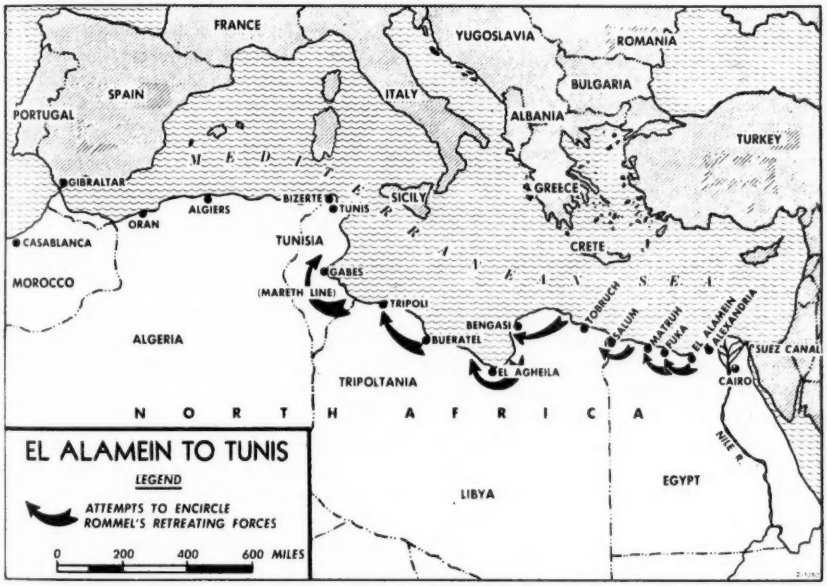
Eventually, after the Eighth Army had maintained an effective direct pressure force against the rear of Rommel's columns for more than 6 months, the enemy's escape route was blocked by American, British, and French forces which had marched east from the vicinity of Casablanca. He, then, was trapped against the Mediterranean Sea, in the vicinity of Tunis, and about 240,000 prisoners were taken.

Aggressiveness

Next to the employment of the direct pressure and encircling forces, *aggressiveness* is considered the most important characteristic or principle of the use of armor in the pursuit. A pursuit, at its

best, is not an easy matter to initiate after a battle. Some units are disorganized, the troops are exhausted, and sometimes a mental reaction sets in resulting in a lethargic attitude among the victors. Aggressiveness is inherent in all successful pursuits, as evidenced by our reading in which "victorious troops, flushed with victory, pursued the beaten enemy." A careful study of these pursuits will indicate that often the controlling factor was an aggressive leader who possessed great daring, initiative, and enthusiasm coupled with a determination to outstrip and annihilate the enemy. The leader must drive his force and use his vehicles and equipment to the utmost. He must not look back nor attempt to keep in line with adjacent units, and he must take a calculated risk as regards his exposed flanks, realizing that the enemy's demoralization greatly reduces the risk involved.

During pursuit by armor, radio is the principal means of communication. If the enemy is off balance and speed is of the essence, radio security becomes less important. The enemy cannot react in time. A German radio intercept team, captured after the 1st Armored Division's pursuit of the enemy to Bizerte, stated that they knew every plan of the division, but did not have time to react. Any attempt by the enemy to reorganize his retreat must be frustrated by maintaining the pursuit day and night. Under no circumstances should the enemy be allowed to break contact. To do so may enable him to evade the enveloping force, slip out of the trap, and again become an effective fighting force.



Many a campaign or victory has fallen far short of being decisive, because of indecision and lack of aggressiveness on the part of the leaders of the victorious forces. The evacuation of the British at Dunkerque is an example of this. As a result of the failure to maintain the pressure to the limit of the endurance of the German forces, the British, by sacrificing a comparatively few rear guard elements,

were able to evacuate 300,000 troops. The German commander failed in his mission to destroy the British Expeditionary Forces.

Another example occurred, closer to home, during the Civil War. We have been taught that the battle of Gettysburg was a Union victory; that it was the turning point of the Civil War; a glorious battle which decided the fate of the Confederacy. Meade won the battle of Gettysburg, but what a hollow victory it was! He defeated Lee on the battlefield, but fell far short of destroying him. When Lee's beaten army withdrew toward Virginia, Meade failed to pursue immediately with his army. After a delay of a day, direct pressure and encircling forces were dispatched. Lee's rear guard halted the small direct pressure force in the mountains, resulting in Meade's next great error. He halted the advance of his enveloping force, his main body of six corps for 1 day. He failed to maintain the momentum of the pursuit. By this time, Lee had reached his one escape bridge over the Potomac River and found that not only had Meade's cavalry destroyed the bridge, but that rains had raised the river so his troops could not make a crossing. In spite of Meade's dawdling pursuit, Lee was trapped.

The Union forces then continued their envelopment, reached the flooded Potomac beside the Confederate forces, but there the pursuit again was stopped! Lee's beaten army, short of supplies, and laden down with wounded, was trapped in enemy territory by superior forces and a flooded river, but Meade failed to press his advantage and consummate the victory. One week after the Confederate troops had been trapped by the river, the Union forces decided to attack and destroy them, but the attack was launched into an empty bridgehead. Lee had constructed another bridge, and the Army of Northern Virginia had escaped to prolong the war for three more years.

Organization and Support

Armor in the pursuit normally advances in multiple columns on roads and trails, prepared at a moment's notice to attack from march column. Consequently, the units are arranged in the columns, as they are on any tactical march, in the order of anticipated employment. Raids by hostile aircraft and tanks always must be expected. Hence, the means of antiaircraft and antitank defense must be distributed throughout the columns.

The pursuing columns are composed of tanks, armored infantry, armored artillery, and engineers, and are organized into combined arms teams. Following and supporting the armored division will be motorized infantry divisions which will relieve the armor on critical terrain features, will protect the lines of communications, mop-up bypassed pockets of resistance, and, after the enemy has been surrounded, will assist in his destruction.

Although the self-propelled artillery will have little trouble keeping up with the mobile forces, heavier and longer range towed artillery will have difficulty and usually will be left behind. In place of it, additional air support, in the form of column cover, may be employed against ground targets. This air support also will give some protection against enemy air. However, protection from enemy air, furnished primarily by the air defense command, is the most important function of the air support, since pursuing forces certainly will be the prime target of hostile air.

The air forces also can be used, in conjunction with the direct pressure force, to continue a relentless attack against the retreating columns to add to their disorganization and to slow down their movement. This will enable the encircling force

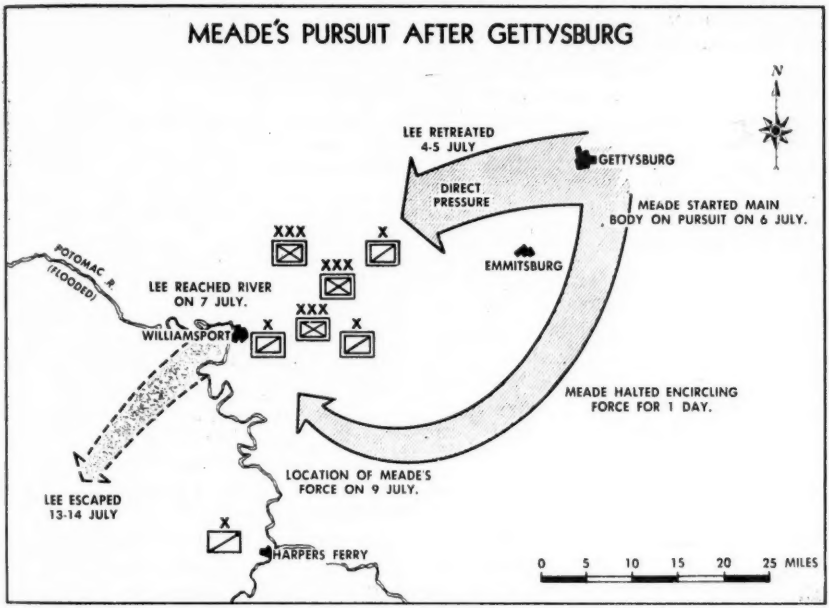
to cut off their retreat more easily. The use of air support must not be restricted to daylight hours. Even at night, combat aviation must cover the enemy's escape routes, and attack the enemy columns and critical points along the routes.

Reconnaissance aircraft must be used to maintain contact with the enemy and to locate any movement of hostile reinforcements. The 20 light aircraft assigned to the armored division are especially helpful in locating enemy roadblocks, in seeking bypass routes, as well as in adjusting artillery fire.

Another critical item of support in pursuit operations is that provided by the engineers. Where a map study indicates its probable use, bridging equipment must be well forward in the columns. The enemy's demolition crews will do all in their power to impede the advance of the pursuing forces, but, because of the speed and surprise with which the armored columns will advance through the hostile rear areas, many bridges on secondary roads will be found to be intact.

Multiple Columns

The pursuit is carried out by employing multiple armored columns over a broad front. The danger of being overextended laterally frequently is an acceptable risk during this phase of combat. The pursuing forces avoid combat and bypass any obstacles or isolated groups of the enemy. By employing multiple columns on a broad front, unobstructed routes toward the objective are found more readily, and the units which are being impeded can be diverted to these routes.



Objectives

The objectives selected for the encircling forces must facilitate the halting and blocking of the enemy while the two forces destroy him. Suitable objectives are mountain passes, bridges, road cen-

ters, or other defiles through which the enemy is expected to pass. Consideration must be given to the fact that if the encircling force is a small, very mobile armored column, it will require all the assistance it can get from the terrain, in order to halt and block the enemy. At times, an airborne or amphibious landing can be used in conjunction with the armored encircling force for the initial seizure of the objectives on the route. If airborne or amphibious troops could have been made available during Montgomery's march from El Alamein to Tunis, the pursuit of Rommel might have met with more success.

Prior Plans

Units automatically are not capable of large-scale pursuits after a victorious battle. The pursuit must be anticipated and be the subject of prior planning. A successful pursuit is a complicated operation requiring great logistic support and co-ordination between the units on, behind, and over the battlefield.

Supplies, bridging equipment, and the transportation to carry these items must be provided prior to the initiation of the pursuit. The plan for the logistical support should be as bold and aggressive as the plan of battle, and the movement of the supplies and services should correspond to the tempo and skill of the combat units. Plans for airborne supply, particularly of fuel and ammunition, should be made in advance to permit the pursuing forces to continue with their mission, even though their supply lines may be cut or so extended that sufficient supplies cannot be brought forward.

Prior plans also include a decision as to what troops are to be used for the pursuit, particularly for the encircling force. If possible, fresh troops should be utilized because their equipment and supplies are in the best possible shape.

The Ruhr Pocket

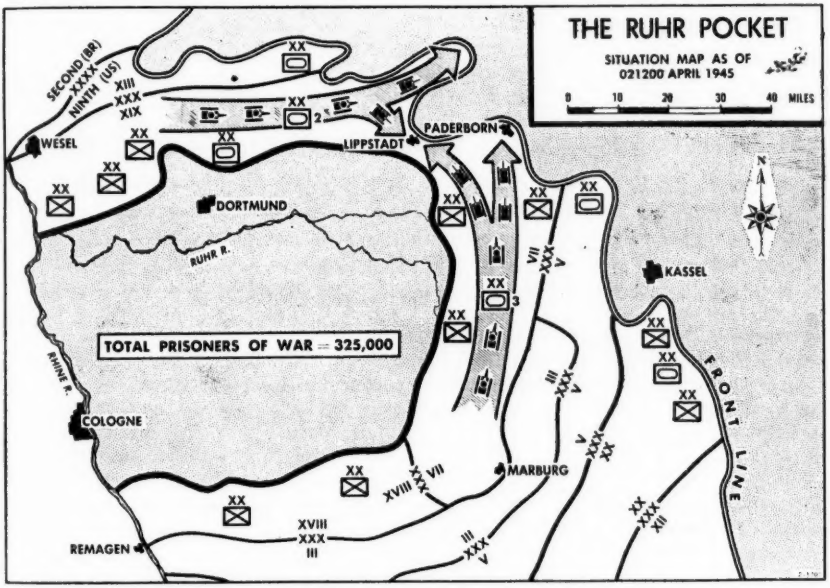
The most fruitful and spectacular pursuit operation in history followed the crossings of the Rhine River at Remagen and Wesel. It is the outstanding illustration of the proper employment of armor in pursuit, with its prior planning and preparation, the employment of direct pressure, the encircling forces, the use of multiple columns on broad fronts, and, above all, a valid demonstration of aggressive leadership.

The operation was planned prior to D-day, long before the allied forces even left England. It initially was planned to be the blow to separate the industrial area from the remainder of Germany. After the German forces between the Roer and Rhine Rivers were defeated, they withdrew behind the Rhine River. The allied forces pursued across the Rhine using a bridge at Remagen and an airborne landing at Wesel. These two bridgeheads then were built up with troops and supplies, and the final phase of the pursuit was begun. Holding or direct pressure forces engaged the enemy on the north flank of the Remagen bridgehead, along the west bank of the Rhine, and on the south flank of the Wesel bridgehead, while the VII Corps and the XVIII Airborne Corps broke out of the bridgeheads to start the encirclement of the German forces.

On the north, after the XVIII Airborne Corps initially broke out of the Wesel bridgehead, it was then passed through by the XIX Corps led by the 2d Armored Division. On the south, the VII Corps broke out of the Remagen bridgehead, spearheaded by the 3d Armored Division.

The two armored divisions threw caution to the winds and maintained the pursuit night and day. What rest the men received was in their moving vehicles. The divisions destroyed or bypassed the many groups of German soldiers which at-

tempted to slow down the armored columns. They advanced on broad fronts, utilizing the entire zone of their respective corps in order to maneuver around pockets of resistence or obstacles. Although the 2d Armored Division advanced 70 miles in its 3-day operation, and the 3d Armored Division moved 180 miles in 7 days, this should not imply that, by encircling the enemy main body, the enveloping armor engaged only in a road march, bypassing all enemy resistance. A delaying action undertaken by the enemy can be costly—the 3d Armored Division lost 53 tanks. Therefore, the enveloping armor must be prepared to crash through the resistance it cannot bypass readily.



As an example of the reckless courage and devotion to duty required of the leaders and staff officers in maintaining an aggressive armored pursuit, Major General Maurice Rose, Commanding General, 3d Armored Division, was captured and killed by a German tank commander during the final phase of the encirclement. The division G3 was captured with General Rose. In two other encounters, the G1 and the division surgeon were taken prisoner.

The two armored divisions met at Lippstadt, thereby closing a 250-mile ring of steel around 21 enemy divisions. The job of capturing or destroying these 325,000 surrounded troops was then passed over to other supporting units and the armored divisions continued to exploit their success by advancing quickly to the Elbe River.

Summary

Unfortunately, not all campaigns are followed by a successful pursuit as did the one culminating in the Ruhr Pocket. It is discouraging to read of the number of celebrated victories which resulted only in indecisive gains by the victor because of the lack of an effective pursuit. Too often the pursuit is considered a mere academic maneuver which is an automatic sequel to every successful battle. The last battle must not be considered the

climax of a campaign. We must realize that the winning of that battle merely is the prelude to victory, for not until a successful pursuit is undertaken can the victors consider themselves not only the masters of the battlefield, but also the masters of all it contained. As so aptly stated by General Eisenhower, "Relentless and speedy pursuit is the most profitable action in war."

Few of us fully appreciate that in each medium tank—which is the backbone of our armored forces—there is a striking and thought-provoking example of our dependence upon others. Each medium tank requires:

1,915 pounds of chromium of which 99 percent of the ore is imported.
950 pounds of manganese of which 92 percent is imported.
520 pounds of nickel of which 92 percent is imported.
100 pounds of tin of which 78 percent is imported.
6,512 pounds of bauxite of which 65 percent is imported.
1,484 pounds of copper of which 29 percent is imported.

General J. Lawton Collins

If the enemy had not miscalculated in Korea, if he had committed at the outset forces of the magnitude that he has now thrown into the struggle, we would have been extremely hard pressed, to say the least, to hold our positions. If now he should decide against peace, we cannot count upon his repeating the same blunder. He has already confronted us in Korea with a defensive air force of modern design. He has progressed from a nineteenth-century kind of war to a mid-twentieth-century kind of war, complete with jet aircraft, radar, and other military paraphernalia of the times.

General Hoyt S. Vandenberg

Planning An Airborne Assault

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Instructor, Command and General Staff College

A THOROUGH knowledge of the capabilities and limitations of the airborne division, coupled with a sound understanding and comprehension of our present tactical doctrine, are prerequisites to the successful employment of airborne forces. No modern innovation in the ancient art of war has so captured the imagination and fired the enthusiasm of military writers and thinkers as has the use of airborne forces to achieve a vertical envelopment. Spurred by an unceasing stream of scientific and technical advances in methods and matériel, both the theorist and the practitioner have lifted their eyes beyond the horizons of World War II and are peering avidly into the future, unshackled by limitations of time and reality. Yet, from the viewpoint of the potential airborne division commander or general staff officer, little has been written concerning the detailed *tactical planning* that begins upon the receipt of the airborne assault mission, and culminates with the flashing of a green light over the enemy's homeland at H-hour on D-day.

The purpose of this article is to cover certain aspects of tactical planning which are peculiar to airborne operations, and discuss the effect of these aspects on planning at the division level. To achieve this purpose, the following discussion is limited in scope to those problems encountered in planning for the employment of a single airborne division on an early link-up operation.

The Plan

The tactical plan must be prepared within the limitations imposed by the availability of air transportation, time, and information of the enemy and terrain in the objective area. At the division level, planning is detailed and performed concurrently with the commanders and staffs of the participating subordinate units.

The essential elements of the tactical plan for an airborne division, employed on an early link-up type operation, are:

1. The mission.
2. The selection of the airhead line and objectives to be seized and defended.
3. The selection of the reconnaissance and security line.
4. The task organization.
5. The landing plan.
6. The air movement plan.

All of the elements of the over-all tactical plan mentioned above are directly related, in that no element can be decided

Despite technological advancements, the measure of success attained in future airborne warfare will depend, as in the past, on the tactical skill with which tools available to airborne commanders are employed

upon without consideration of the others. However, the mission assigned the division is the foundation upon which all other elements are based.

The Mission

Airborne forces may be employed to accomplish a variety of missions. In the past, they have been used primarily in offensive roles, usually as a part of an over-all offensive operation involving large ground forces. Conceivably, any mission given an airborne force will require the seizure and defense of critical terrain. The mission given the airborne division is prescribed by higher headquarters, such as an airborne force or a theater. During the early stages of planning, the mission may be issued in fragmentary form to facilitate concurrent planning.

The Airhead Line

Upon receipt of the mission, the first major decision required of the airborne division commander is the selection of the airhead to be seized and the objectives that must be captured. The airhead line and the specific objectives are selected concurrently, since objectives generally are within the airhead line, and their location, therefore, may dictate, to some extent, the trace of the airhead line. Conversely, the airhead line selected may require the seizure of certain terrain features to permit control of the area encompassed within the airhead.

Before discussing the selection of the airhead line, it might be well to examine objectively what the airhead line denotes. Special Text 71-30-1, *Airborne Operations*, dated 1 October 1951, published by the Command and General Staff College, states that: "The airhead line marks the outer limits of the area which is to be denied to the enemy by employing the principles of mobile defense." To expand this basic definition, the airhead line, during the initial phase of an airborne assault, could be termed an objective or phase line which marks the farthest advance of the main attacking force, although security elements are pushed out beyond this line. During the defense, the airhead line is comparable with the main line of resistance in a conventional defensive action.

In selecting the airhead line, the airborne division commander gives careful consideration to the following factors:

1. The mission of the division.
2. The expected time of link-up.
3. The availability and location of drop and landing zones.
4. The characteristics of the terrain.
5. The expected enemy reaction.

The factors mentioned above do not constitute an exact formula which can be applied in every tactical situation to arrive at a sound solution; rather, they serve as a guide and a method of approach in arriving at such a solution. Each factor must be weighed carefully, first, on its own merits, and, then, together with the others. In a given situation, however, one of these factors may be of such importance that it will outweigh all others.

The mission is the first factor to be applied in determining where to place the airhead line. Regardless of what other criteria the airhead line may meet, it is unsatisfactory if it does not permit the successful accomplishment of the division's assigned mission. If the mission requires the capture of an airfield, bridge, or intelligence objective intact, then the airhead line should be so located as to prevent enemy ground observed artillery fire from being placed on that objective. This problem cannot be resolved solely by using a figure of linear measurement; rather it requires a detailed study and analysis of the terrain together with accurate information in regard to the enemy's ground fire capabilities.

The expected time of link-up is an inherent part of the assigned mission since

the critical terrain to be seized must be defended until the arrival of friendly ground forces. The time from H-hour on D-day until link-up may vary widely. In one situation, the ground forces may launch their attack prior to the airborne force and arrive in the objective area simultaneously or within a few hours after the drop. In other situations, link-up may not be planned until D plus 2 or D plus 3. Obviously, the airborne division can defend, for a few hours, an extensive airhead which would be entirely beyond its capabilities after the advantage of surprise is lost and the enemy has had an opportunity to launch an organized attack.

The availability and location of drop and landing zones is a requirement unique to airborne operations, and one which exercises a controlling influence over operational planning from the outset. The importance of the availability and location of these areas to the success of an airborne assault is comparable with the importance of suitable landing beaches in an amphibious operation. Airborne forces should, wherever possible, land on or near to their assigned objectives. Surprise, perhaps, is the greatest advantage that airborne forces enjoy, and this advantage diminishes rapidly from the moment the first parachute opens over the objective area. If drop and landing zones are some distance from initial objectives, then the time required to travel that distance, after the necessary reorganization, proportionately reduces the opportunity to seize the objective without encountering organized enemy resistance.

Parachute troops can land in rugged terrain with relatively few jump casualties. Although airborne operations, conducted in World War II, are replete with examples of units missing their assigned drop zone, no failure to perform assigned tasks has been attributed to a large number of casualties. The greatest number of jump casualties in World War II operations was suffered by the 503d Parachute Infantry Regiment in the airborne landing on Corregidor. Slightly more than 11 percent of the forces employed became jump casualties, yet the assigned tasks were carried out as planned.

Antiairborne obstacles, inundated areas, rocks, and built-up areas offer the greatest hazards to the jumper. With the increased proportion of heavy equipment being dropped by parachute, however, more consideration will have to be given to the selection of areas suitable for the safe landing and recovery of such items.

Individual drop zones should be of a size sufficient to accommodate the force to be dropped. As a yardstick, an area 1,700 yards square is ample for an airborne infantry battalion.

Landing zones for assault aircraft pose a somewhat different problem. These aircraft are by no means expendable. The selection of landing zones is controlled, not by the space required for the aircraft to land, but that needed for it to take off. This latter distance presently is 1,100 feet, with no load in the aircraft, and carrying only 50 percent of its fuel capacity. Contrary to popular belief, the landing characteristics of assault aircraft compare most favorably with that of the glider, because of the inherently greater maneuverability of the powered aircraft which allows the pilot to control his approach to landing. Assault aircraft should land in proximity to that portion of the airhead where their loads are to be employed initially.

All drop and landing zones should be located within the airhead perimeter. The paucity of suitable areas for landings in extremely adverse terrain could exercise considerable influence on the location and dimensions of the airhead line. In terrain where drop and landing zones are abundant, their availability and location exert a lesser influence upon the selection of the airhead line.

The characteristics of the terrain are

considered separately from the previous factor although both might well be lumped together as "terrain considerations." The airhead line should be so located as to take maximum advantage of the defensive strength of the terrain. Terrain features affording observation of enemy routes of approach into the airhead are essential for the defense. Particular attention should be given to those features of the terrain which will impede the movement of enemy armor. Wherever possible, advantage is taken of natural obstacles such as water courses, mountains, marshes, and ravines. Cover, concealment, fields of fire, and routes of communications exercise the same influence in the selection of an airhead line as in the selection of a main line of resistance for a battle position. Covered routes of movement, within the airhead, facilitate the shifting of forces with minimum enemy interference. Obstacles within the airhead, particularly unfordable water courses, pose a difficult problem for airborne forces because of a normal lack of bridging material in the airhead, and the necessity of being able to shift forces rapidly to threatened points on the perimeter.

Adequate terrain intelligence is essential to successful planning. Since the nature of airborne operations precludes ground reconnaissance, the airborne division commander and his staff must make terrain studies and prepare plans from reproductions of the terrain using maps, aerial photographs, and scale models. Visual aerial reconnaissance is a helpful supplement but it does not permit an opportunity for detailed analysis.

The expected enemy reaction is the last but not least important consideration in determining the location of the airhead line. Airborne forces necessarily must depend upon agencies beyond their control to obtain intelligence of the enemy. Initially, they are not in contact, and the enemy strengths and dispositions in which airborne forces have primary interest are, more often than not, located well behind any established front. The airborne commander concerns himself, first, with the estimated strength and resistance to be encountered in seizing the initial objectives and airhead line. Next, he must consider the reinforcing capability of the enemy, and arrive at a conclusion as to the speed and manner in which the enemy will react to the landing. This estimate must cover the span from H-hour on D-day to the link-up.

If the enemy is capable of reacting swiftly with sizable forces, then the overall area that the airborne division can seize and hold will be reduced proportionately. Confronted with an enemy strong in armor, the location of the airhead line, so as to take maximum advantage of tank barriers, assumes greater significance. The characteristics of ground weapons that the enemy may employ against the airhead also must be considered. For example, the enemy's capability of employing long-range artillery may require a larger airhead to protect vital installations from destructive fire.

Objectives

As mentioned earlier, the airhead line and objectives are selected concurrently. In selecting the objectives, the airborne division commander should, for each objective, determine the answer to these questions:

1. Will the seizure of the objective further the accomplishment of the division's mission?

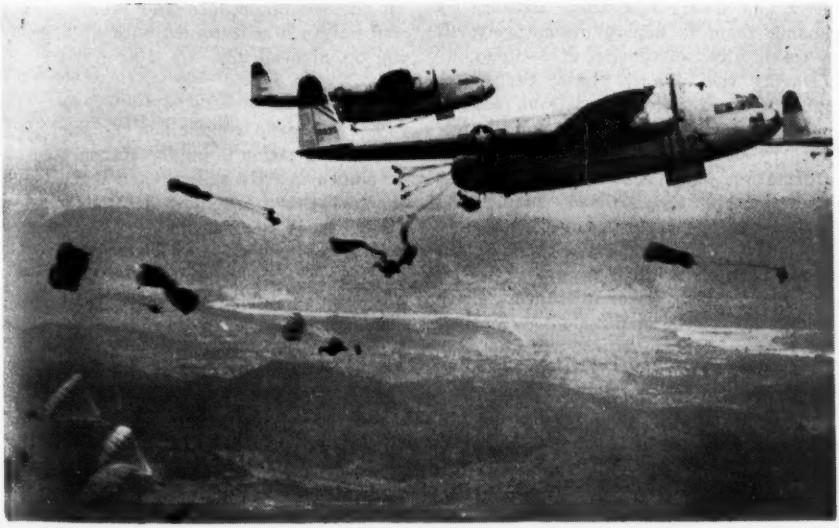
2. Is the seizure of the objective within the capability of the unit, in view of expected enemy resistance?

3. Is it on dominant or critical terrain?

4. Is its capture essential to the defense of the airhead?

Because of the advantage of surprise and the initial preponderance of force, an airborne division, in a given situation, probably will be able to seize more

Airborne forces have been employed twice in the current action in Korea, and, in a future war, airborne warfare may play an even greater part. Above, paratroopers boarding a *C-119* prior to a drop behind enemy lines in Korea. Below, paratroopers pile out of *C-119s* over the Sunchon area north of Pyongyang, Korea.—Department of Defense photos.



objectives than it subsequently can defend when the enemy reacts in strength. More so than the ground commander, the airborne commander must plan his assault in terms of what he is capable of defending. Most specific objectives, in World War II airborne operations, were of battalion size. The battalion forms a good yardstick in determining what and how many objectives are to be seized and defended. The assignment of more than six battalion-size objectives for the initial assault seriously reduces the flexibility because of a depletion of reserves. However, units initially in reserve may be given secondary missions such as clearing and protecting landing or drop zones.

Reconnaissance and Security Line

The reconnaissance and security line is an element of the assault plan which is peculiar to airborne operations. Its exact counterpart is not found in normal ground operations. The purpose of the reconnaissance and security line is to provide information and early warning of the approach of enemy forces, and to delay and disorganize their advance by causing them to deploy prematurely. It is, essentially, an echelon of security.

During the assault phase, the forces manning the reconnaissance and security line land early and proceed immediately to carry out their mission of providing information and protection for friendly forces within the airhead during the critical reorganization and assembly period. During this phase, their action closely parallels that of a cavalry reconnaissance unit. Reconnaissance, along main routes of communications, is pushed out aggressively to gain contact. Later in the operation, during the defensive phase, the action more closely parallels that of the outpost line of resistance in a conventional defense.

The reconnaissance and security line is located forward of the airhead line. It is not, strictly speaking, a line, but rather a series of positions (observation posts and road blocks) which may or may not be mutually supporting. Wherever possible, the reconnaissance and security line is located on dominating ground which affords observation of favorable avenues of approach for the enemy. It is located, normally, within range of the artillery in the airhead.

The number of units or troops assigned to the reconnaissance and security line varies with each situation. The controlling factors are the number of positions or posts to be occupied, the distance from the airhead line, the communications and transportation available, and the enemy situation. Artillery forward observers and tactical air control parties are stationed on the reconnaissance and security line to direct artillery fires and close air support missions. The reconnaissance company of the airborne division is organized and trained to perform this type mission, although often it will have to be reinforced.

Constant patrolling is conducted between observation posts and road blocks on the reconnaissance and security line, and liaison is maintained with units holding the airhead line.

Task Organization

The airborne commander develops his task organization to implement the scheme of maneuver. He tailors each force to do the task that he assigns it. Considerable flexibility is possible in arriving at the task organization for an airborne assault, but, generally, the major assault forces are grouped under the three regimental headquarters.

Combat team formations are normal, with each combat team containing all or part of an infantry regiment, with attached artillery, engineers, tactical air control parties, and such other elements as are required to perform the task assigned. This task organization is based on decentralized execution during the

assault phase. Decentralized execution is employed through necessity rather than desirability. As an example, it would be preferable to have all of the division's artillery under centralized control immediately upon landing, but the time required to establish the necessary communications would deny artillery support to the attacking infantry during the most critical phase of the operation. Combat teams are dissolved as rapidly as communications are established. Centralized control of operations then is regained.

Those elements of the division that do not enter the airhead as part of the assault force are grouped under the *follow-up echelon* and *rear echelon.* The follow-up echelon consists primarily of those combat and combat support units not included in the airborne assault; the rear echelon is composed of the administrative and logistical elements of the division not needed for short periods of combat. The follow-up echelon usually arrives in the airhead with the link-up ground forces, but may be brought in by air.

In arriving at a task organization, the airborne commander must consider the boundaries by which he will allocate areas of responsibility to subordinate units. There are four factors peculiar to airborne operations that must be recognized in locating boundaries:

1. Adequate drop and landing zones should be included within a unit's zone of action.

2. Boundaries should require minimum readjustment when passing to the defense.

3. Zones assigned should facilitate a convergance of effort by regiments, that is, minimize a requirement for fighting in opposite directions.

4. The area of responsibility assigned to the unit furnishing the division reserve should reflect its reduced strength.

An adequate reserve must be provided for in developing the task organization. Here again, the airborne commander finds himself confronted with a situation somewhat different from normal ground combat. The luxury of an infantry regiment and a tank battalion in reserve seldom can be afforded in airhead operations. Aircraft capabilities and tank specifications as yet do not permit the early delivery of armor into the airhead. The geometrical configuration of the airhead makes greater demands, proportionately, on the forces available to defend it, and the airborne commander normally finds himself with a reserve of one or two battalions of infantry, taken from a combat team whose task and zone of responsibility have been reduced to compensate for this planned reduction in its strength.

Landing Plan

The landing plan is based on the airborne commander's scheme of ground maneuver, and is designed to support that scheme of maneuver to the maximum extent possible within the limitations of the availability and location of suitable drop and landing zones. The landing plan primarily is concerned with which unit is to land where and when. Figure 1 is an example of a form that can be used to express the essential elements of a landing plan. Figure 2 is a schematic picture of how the landing plan is designed to support the ground scheme of maneuver. Note that the artillery is landed behind and within supporting distance of the infantry elements it is to support, and that the infantry elements are landed close to the objectives they are to seize. Having them land on their objectives is most desirable.

The final selection of drop and landing zones to support the scheme of maneuver is a responsibility of the airborne commander. The air force A2 and the airborne division G2 select those areas, within the objective area, that are suitable as drop and landing zones. Actually, the air force has little concern with the selection of drop zones for parachutists as long as they can be located and identified from

the air, and the routes of approach and departure are suitable.

The air force's concern with the selection of landing zones for assault aircraft is more pronounced, however, since the technical requirements for landing, take-off, and ground operations must meet the minimum specification of the troop carrier commander. The desires of the airborne commander, when weighed against those of the troop carrier commander, often will be in conflict, and they must be resolved by a compromise satisfactory to both parties.

The Air Movement Plan

The air movement plan is based on the landing plan, and cannot be completed until final decisions are reached in regard to the details of the tactical plan and the landing plan. The airborne commander's landing priorities normally will dictate the sequence of take-off at departure airfields, except where air traffic problems are the controlling factors. Regardless of take-off sequence, the troop carrier command endeavors to land each serial of the assault force at the exact time and place desired by the airborne commander.

The preparation of the air movement plan is a joint task performed by both the airborne and troop carrier staffs. Figure 3 shows a suitable form for setting forth the information that must be included in the air movement plan. The portions of the plan prepared by the airborne staff and air force staff are indicated.

Defense of the Airhead

Having discussed those factors that influence preparation of the assault plan, to include selection of the airhead line, it is appropriate to consider how the airhead is to be defended.

The defense of an airhead may be conducted by any one of the three types of defensive operations, by a combination of any two of them, or by using all three types.

The first concept is that of the delaying action where the defender trades space for time. Essentially, applied to the defense of an airhead, this type operation envisions the initial seizure of a large airhead, followed by delaying operations on successive positions. As enemy pressure increases, the perimeter of the airhead shrinks until the final delaying position is reached and the defender must adopt either the mobile or position type defense. Ideally, such an operation should be planned so that link-up occurs shortly after the defender withdraws to the final position. Although this type operation might be employed with large airborne forces, it has serious disadvantages if used in connection with a single airborne division employed on a quick link-up operation.

First, it runs a great risk of being defeated in detail.

Second, for the successful conduct of a delaying action, according to our present doctrine, the defender should have equal or superior mobility in comparison with the attacker. Airborne forces, to date, are not considered highly mobile after once leaving their airplanes.

Third, lack of armor in the airhead places the airborne commander at a disadvantage over his ground counterpart in conducting delaying action.

Fourth, the problem of regaining command control, already a critical one, is increased materially for the airborne commander when he undertakes to seize enough terrain to permit the adoption of delaying tactics.

Fifth, the increased maneuver room required for the proper conduct of delaying action extends the airhead so greatly that the problem of covering the resulting gaps between units becomes extremely difficult, and the degree of mutual support, even with artillery, is insufficient.

Actually, all of the disadvantages listed

PARACHUTE OR ASSAULT AIRCRAFT

	1	2	3	4	5	6	7	8
1				AIRCRAFT ASSIGNMENT				
2	UNIT	STANDARD LIFT (C-119)	DZ(S) LZ(S) USED BY UNIT	SERIAL 1 DZ—X A	SERIAL 2 DZ—X B	SERIAL 3 DZ—X C	SERIAL 4 DZ—X D	SERIAL 5 DZ—LZ
3								
4								
5								
6								
7	304TH CT							
8	1ST BN	(36)	A	36				
9	2D BN	(36)	B		36			
10	3D BN	(36)	D			36		
11	405TH ARM FA BN	(19)	C			19		
12								
13								
14								
15								
16								
47								
48								
49								
50								
51								
52								
53								
54								
55								
56	TOTALS (FINAL NUMBER OF AIRCRAFT PER SERIAL)							
57	ORDER OF LANDING PRIORITY							
58	DEPARTURE FIELDS DESIRED							

ASSIGNMENT WORK SHEET

	13	14	15	16
	TO SERIAL(S) AND DZ—LZ USED BY SERIAL(S)			
	SERIAL 10 DZ—LZ	SERIAL 11 DZ—LZ	SERIAL 12 DZ—LZ	RECAPITULATION
				NUMBER OF WINGS ASSIGNED =
				NUMBER OF AIRFIELDS ASSIGNED =
				NUMBER OF SERIALS =
				NUMBER OF SERIALS TO DZ—LZ =
				NUMBER OF SERIALS TO DZ—LZ =
				NUMBER OF SERIALS TO DZ—LZ =
				TASK ORGANIZATION FOR MISSION:

FIGURE 1.

above stem from a lack of mobility and the inexorable ratio of the circumference of a circle to its radius. Although, conceivably, this form of defensive action might be employed in a special situation where its inherent disadvantages are mitigated by exceptional conditions of terrain and expected enemy reaction, it cannot be considered a normal method of airhead defense for a single division operation.

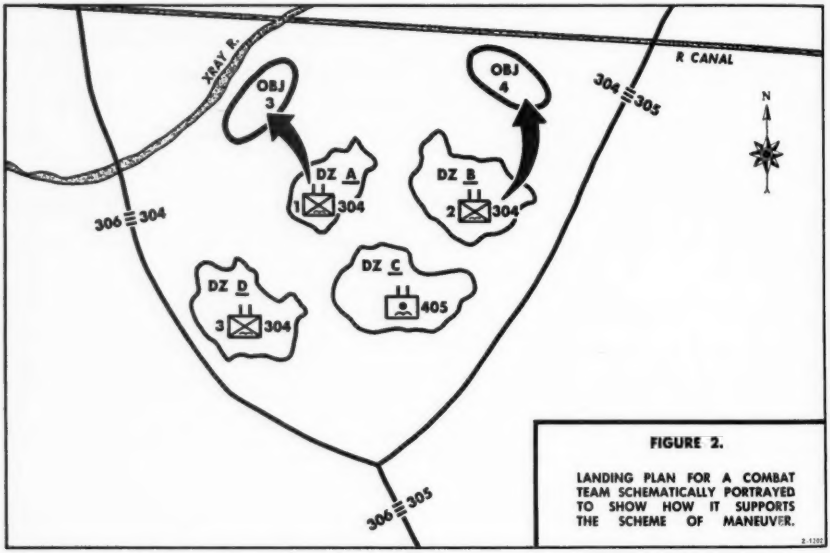


FIGURE 2.

LANDING PLAN FOR A COMBAT TEAM SCHEMATICALLY PORTRAYED TO SHOW HOW IT SUPPORTS THE SCHEME OF MANEUVER.

The second method by which an airhead might be defended is through use of the position or compact type defense. This envisions the organization of the airhead line in the same manner as the main line of resistance in a position defense, with the intention of holding the position at all costs. On the surface, this type appears to have much strength, but closer examination reveals that, when applied to the defense of a division airhead, certain important difficulties exist. If the division commander should elect to utilize all nine of his infantry battalions on the airhead line, holding out no reserve, he could occupy a perimeter of about 22,500 yards (based on each battalion defending a 2,500-yard frontage). The airhead, under these conditions, would have a radius of about 3,500 yards. An attacker could, therefore, bring the greater part of the airhead under heavy mortar and artillery fire from one position, and a penetration in any sector well might threaten the integrity of the entire airhead defense. Holding out an adequate reserve reduces the perimeter proportionately. The protected area within the center of the airhead then would become so congested as to make logistical and administrative operations extremely difficult, and all the more susceptible to enemy interference. Lack of depth obviously is the chief difficulty with this system.

The third type of operation is the mobile defense, the type employed in defending a wide front. The mobile defense envisions the selection of critical terrain features which cover the main routes of approach, and the organization of these features for all-round defense. The mo-

AIR MOVEMENT TABLE

1	2	3	4	5	6	7	8	9	10	11	12
SERIAL NUMBER	AIR FORCE UNITS			GROUND FORCE UNITS							
	CARRIER UNIT	SERIAL COMMANDER	NUMBER/ TYPE PLANES	NUMBER OF PLANES REQUIRED	PLANES LOADED WITH	SERIAL COMMANDER	DEPART FROM AIRFIELD	HOUR LOADING BEGINS	STATIONS	TAKE OFF	OBJECTIVE
1	160TH TROOP CARRIER WING	LT COL SMITH	(C-119) 38	38	1ST BATTALION, 504TH AIRBORNE INFANTRY	LT COL JONES	A-1	0200	0430	0500	DZ A
2	161ST TROOP CARRIER WING	LT COL JACKS	38	38	2D BATTALION, 504TH AIRBORNE INFANTRY	LT COL CASEY	A-2	0200	0430	0505	DZ B
3	162D TROOP CARRIER WING	LT COL RALPH	19	19	405TH AIRBORNE FIELD ARTILLERY BATTALION	LT COL FIRE	A-4	0200	0430	0509	DZ C
4	182D TROOP CARRIER WING	LT COL FLY	38	38	3D BATTALION, 504TH AIRBORNE INFANTRY	LT COL BLACK	A-5	0200	0430	0512	DZ D
5											
6											
13											
14											
15											
16	PREPARED BY THE AIR FORCE STAFF				PREPARED BY THE AIRBORNE STAFF						
17											
18											
19											
20											
21											
22											
23											
24											
25											

FIGURE 3.

THE AIR MOVEMENT TABLE CONTAINS THE ESSENTIAL ELEMENTS OF THE AIR MOVEMENT PLAN. OTHER DETAILS OF THE AIR MOVEMENT PLAN INCLUDE THE FLIGHT ROUTE, PARKING DIAGRAMS, AND TRAFFIC CONTROL PLAN. THESE DETAILS ARE SHOWN ON OTHER APPROPRIATE FORMS OR DIAGRAMS.

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bile defense sacrifices full mutual support between adjacent defensive areas, and depends, to a greater degree, upon the counterattack with strong reserves to maintain the integrity of the position. The unoccupied terrain between defense areas is covered by fire, mines, obstacles, and continuous patrolling.

The mobile defense is the type best adapted for the defense of an airhead, but, in applying the principles of the mobile defense, some modifications must be made because of specific differences that normally will prevail in airborne operations when compared with ground operations.

First, the reserves of the size normally held out in the mobile defense may not be available to the airborne commander. Second, the frontages involved, more often than not, will exceed those usually associated with an infantry division's capability in the mobile defense. Third, the counterattack by higher echelon reserves—corps or army—normally associated with the mobile defense, will not be available. Fourth, the absence of armor and heavy artillery in the airhead considerably reduces the "punch" that should be part of the counterattack.

What does the airborne commander have to offset these disadvantages?

Perhaps the greatest asset is psychological. From the commander himself down through the rank and file, every trooper knows that the airhead must be held for a given length of time against whatever the enemy throws at it. Such knowledge may not increase the fighter's skill, but it certainly influences the spirit and determination with which that skill is applied.

A more tangible asset is the generally circular shape of the airhead which facilitates the shifting of troops from unengaged sectors to any sector that is threatened. This, to a large degree, compensates for the lack of a large, mobile reserve specifically designated as such. The interior lines of communications are short, and the time required to commit available reserves is reduced.

Airborne forces usually are committed deep in the enemy rear areas where the likelihood of encountering first-line enemy units is remote. The length of time that the airhead must be defended, generally, is relatively short, and the enemy has less time to bring up heavy reinforcements and organize a determined attack. Since air superiority is a recognized basic prerequisite for the execution of airborne operations, the airborne commander can expect to have available tactical air support in a greater degree than normally is the case in ground defensive operations.

Summary

The planning and executing of airborne operations involve no new principles, but they do require the application of existing principles to situations and conditions that normally are not encountered in ground operations. The differences between combat conducted by airborne forces and normal ground action all stem from the method of transporting the forces and their supplies to the battlefield. These differences require a somewhat different approach to the planning problem, and have resulted in the development of certain planning techniques with which the airborne planner must be familiar.

The airborne assault was pioneered in World War II, and amazing strides had been made by the end of that conflict. Airborne forces have been employed in airborne assault roles twice in the current action in Korea. In a future war, no one denies that airborne warfare will play an even greater part than it has in the past. Current and projected develop-

ments in the field of airborne impedimenta will provide future airborne commanders with tools far superior to those available to their predecessors, but the measure of success attained in the airborne warfare of the future will depend, as in the past, on the tactical skill with which these tools are employed.

Certainly transport of ground forces and their equipment by air would be a vital factor in the battles of any future war. Therefore, our ultimate goal is to have all Army combat elements (except armored divisions) and their supporting units capable of making airborne assaults. This means that the Army must maintain the nucleus of trained, equipped airborne divisions capable of employment in an airborne assault, and that the remainder of the Army must, insofar as possible, be organized, trained, and equipped in such a manner as to be air transportable.

General J. Lawton Collins

The tools and techniques of war change constantly but the task of the foot soldier—to close with and destroy the enemy—never varies.

Major General John H. Church

tates the shifting of troops from unen-

play an even greater part than it has in the past. Current and projected develop-

MANPOWER ECONOMY

Colonel Richard E. Weber, Jr., *Artillery*
Instructor, Command and General Staff College

AT THE close of World War II, we were "scraping the bottom of the barrel" for manpower. The same situation is not far away today. However, it may be avoided by strict manpower economy.

"Scraping the bottom of the barrel" catches the fancy but certainly does not describe accurately the manpower situation. At the close of World War II, there were still several million men liable for military service. True, many had been deferred for physical or other reasons, but, had the military situation demanded, they could have and they would have been re-examined and inducted as necessary. While most of the "cream" had been drawn off in earlier calls, there was still a lot of "skimmed milk" left.

The military strength of a nation depends not only on its armed forces but upon its industrial capacity to produce the implements of war. A balance must be struck between the competing manpower requirements of the armed forces and of industry. Heretofore, during peacetime, the manpower requirements of the armed forces were so small as to be negligible. With approximately 3,500,000 men now in the armed forces, this is no longer true. The armed forces, as now constituted, include more than a tenth of the Nation's manpower between the ages of 18 and 44, a third of the manpower between 18 and 26, and more than half of the age group 18 to 20.

As a result of the Korean situation, the armed forces have expanded to approximately 3,500,000 persons. The bulk of this expansion is made up of reservists called to active duty either as individuals or as units, with the balance being furnished by Selective Service or obtained through recruiting. Assuming that the regular members of the armed forces do not exceed 1,500,000, the remaining 2,000,000 must be replaced upon the completion of their 24 months of active service. To do this will require approximately 100,000 men each month (less those that re-enlist).

The manpower pool, presently available through Selective Service, includes the age group 19 to 26 and numbers approximately 8,000,000 men. Liberal deferments for previous service, dependency, and educational considerations reduce materially the number in the group available for service. In little less than a year, this pool was almost depleted of nondeferable men acceptable to the armed forces. Despite changed deferment policies, the only major source of additional manpower is the monthly influx of approximately 100,000 young men who become of military age.

It is apparent that we are again "scraping the bottom of the barrel." The solution lies in enlarging the pool, in utilizing the available manpower more efficiently, or in a combination of both.

Any consideration of the manpower pool must include the factor of *quality* as well as *quantity*. Quality may be de-

scribed as the combination of physical fitness, learning ability, developed technical skill, and leadership characteristics possessed by an individual in comparison with other individuals. Quality is a relative rather than an absolute measure. The common measures of quality are the physical profile and the general classification test (GCT).

Physical Quality

The physical classification system is based, primarily, upon the functional ability of an individual to perform military duties. In developing the system, the human functions have been designated "PULHES" (see the Figure on page 51). There are four grades in each of the six factors. Grade 4 indicates defects which are below the minimum physical acceptability standards of the armed forces. To facilitate the assignment of individuals after they have been given a physical profile serial, the letters "A," "B," "C," and "E" have been adopted as a code to represent certain combinations of grades in the various factors. These are:

1. "A"—An individual with a profile serial of 111111.

2. "B"—An individual with a profile serial containing the number 2 as the lowest grade in any factor, as, for example, 111121, 222221, or 222222.

3. "C"—An individual with a profile serial containing the number 3 as the lowest grade in any factor, as, for example, 333233, 111131, or 232211.

4. "E"—An individual with a profile serial containing the number 4 as the lowest grade in any factor, as, for example, 114111.

The "PULHES" physical profile system was first adopted in the fall of 1944. During the period December 1944 to April 1945, men reporting for induction were distributed approximately as follows:

Code	*Percent*
"A"	60
"B"	20
"C"	6
"E"	14

Of the men inducted by the Army, the distribution was "A," 70 percent; "B," 23 percent; and "C," 7 percent. Based on these figures, and making allowances for additional personnel acceptable under lower physical standards for induction, the armed forces must plan to receive one-third of their personnel with physical profiles below "A."

During World War II, although both the Army and the Navy obtained men through Selective Service, each set its own standards for acceptability. In addition, from time to time, these standards varied within each service. It was not unusual, for example, for the Selective Service authorities to deliver the same personnel to two or more services in succession, only to have them rejected and returned temporarily to civilian life, there to await the next requisition by the service with the lowest standards, or until increased manpower needs forced a reduction in the standards of the other services.

A nation's military strength depends not only on its armed forces but upon its industrial capacity to produce war matériel. Competing manpower requirements of the armed forces and industry must be balanced

The three services recognize the inefficiency and avoidable manpower wastage inherent under a system of independent standards and have agreed to common mental and physical standards for induction. The common standards, however, apply only to personnel secured through

Selective Service. Until a service resorts to Selective Service for its personnel, it is free to set its own standards.

Minimum standards of acceptability must truly separate those capable of useful military service from those who are not. During World War II, relatively high physical standards were established initially. Before the armed forces met their expansion goals, the acceptable manpower pool had to be enlarged by reducing physical standards and by tightening Selective Service deferment policies. As a result, there was an appreciable lowering in the general average of quality among the men inducted in 1944 and 1945. The 1951 amendments to the Universal Military Training and Service Act provide that the minimum physical standards for induction will be no higher than those of January 1945 for ages 18 to 26.

For the most effective use of manpower, that is, where each man is used to the full extent of his ability, provision must be made whereby the services can indicate by number and type the personnel they need at specific times. For example, assuming that the common minimum physical standard adopted is "C," the services might request induction as follows: M-day to M plus 90, 80 percent in category "A"; M plus 91 to M plus 180, 50 percent in classification "A"; M plus 181 to M plus 300, 60 percent in category "A"; and M plus 301 to M plus 420, 70 percent in classification "A." By this method, the armed forces could adjust the type of personnel inducted to the type units being activated, so as to achieve the maximum correlation between the physical requirements of the job to be filled and the physical capability of the man to fill it.

Selective induction is essential for manpower economy. A cross section of the physical quality of the manpower pool is not necessarily an efficient use of the manpower. The lower quality manpower should serve in communications zone or Zone of Interior units rather than in combat units. Units on the mobilization troop list are activated in accordance with the time required to train them and their planned employment. Thus, the units activated in any month are not, necessarily, a cross section of the troop list, since combat units usually require longer periods of training than do service units. In addition, the proportion of "A's" and "B's" varies among combat units. By calling for the minimum number of "A's" for the units being activated during the expansion period, there will be sufficient combat-fit personnel in the manpower pool during the maintenance period when the primary need is for combat replacements.

Mental Quality

Mental quality is expressed as a measurement of the individual's learning ability.

During World War II, learning ability was determined by a general classification test given to all personnel inducted into the armed forces. At present, the armed forces qualification test (AFQT), a modification of the GCT, is employed to determine the acceptability of the individual, and its score, expressed in percentile points, serves as the basis for the equitable distribution of mental quality among the three services. Within the Army, individuals are given a battery of 10 tests which, connected to standard scores and in various combinations, indicate the individual's aptitude for receiving training in 10 possible areas of employment. Aptitude Area I scores correspond closely to the former GCT scores.

Based on scores obtained in the GCT, personnel were grouped into the following grades:

Grade	*Score*
I	130 or higher
II	110-129
III	90-109
IV	60-89
V	59 or lower

During World War II, the distribution of grades of men inducted into the Army was approximately as follows:

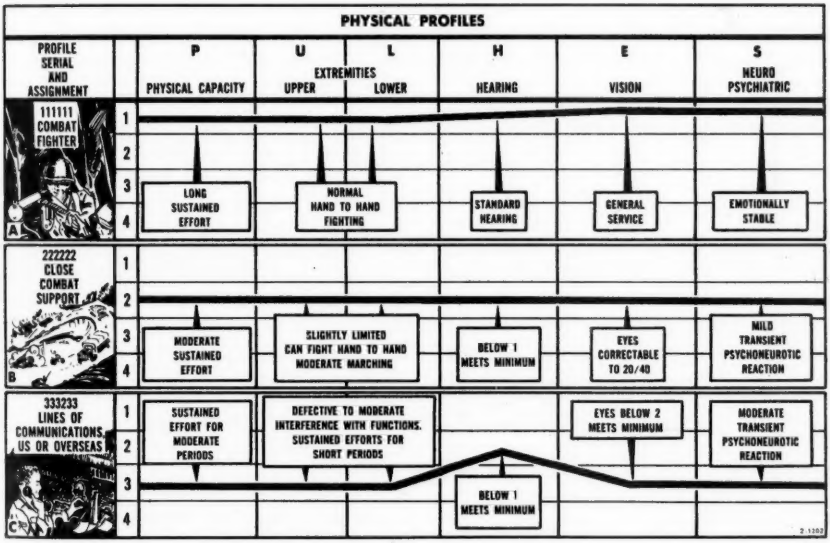
Grade	*Percent*
I	6
II	29
III	31
IV	31
V	3

Experience has shown that men close to or in Grade V require much more time to master a subject than those in Grade III or higher. Quite naturally, the military services prefer men who will absorb training readily. The minimum acceptable mental score for *volunteers* in the Air Force (90) reflects this concept. The national manpower pool is not so large that the men in the lower third can be rejected because they are more difficult to train.

The 1951 amendments to the Universal Military Training and Service Act permit the rejection of only the lowest 10 percent of the manpower pool.

If only a few low-score men are in a group, normally no special measures are taken to readjust the training schedule. They are carried along with the group. However, if the bulk of those in a group have low GCT scores, additional instructors and additional time are required to train them. In specialized and technical subjects, excess numbers of low-score men compound the training difficulties. At present, there is a tendency toward an inequitable distribution of low-score men since they are acceptable only to the Army.

The development of leaders, in adequate numbers, is essential to the efficiency of the armed forces. To date, no test has been devised which will select leaders or potential leaders accurately enough to be adopted. However, there is a relationship between learning ability and potential leadership. A high GCT score automatically does not make a man a leader, but more leaders are developed from high-score groups than from low-score groups. Until a more reliable test is developed, the



GCT score is the best indication of potential leadership available.

There is no question of a shortage of men with potential leadership ability. It is, again, one of distribution. The manpower is present, but not in such quantities that it can be wasted. There must be an equitable distribution of mental as well as physical quality among the armed forces.

Procurement of Manpower

With the very real prospect of the United States maintaining 3,500,000 or more men in the armed forces for the next several years, a new approach to securing manpower is needed. The United States always has regarded volunteer recruiting as the proper method for building and maintaining its regular and reserve forces. As long as the strength of the forces was small, this policy worked very well. However, it is unreliable for the maintainance of large forces. Beginning with the Civil War, conscription or Selective Service has been the means of supplying men for major conflicts.

Old habits die hard and so it is with recruiting. Although Selective Service was in effect before Pearl Harbor, recruiting was continued by the Army—including the Army Air Force—and the Navy until December 1942. Thereafter, the recruiting of men 18 to 37 was prohibited since it interfered with the operation of Selective Service. Many of the men that volunteered did so after they had been notified by their Selective Service board to report for induction. As a result, another man had to be furnished for induction. Selective Service, in effect, furnished two men, one a volunteer and the other an inductee, but received credit for only one, the inductee. When Selective Service is in operation, a recruiting service is an unnecessary competing agency.

Recruiting has one very important feature in contrast with Selective Service. The military service accepting the volunteer can establish the physical and mental standards it desires. This is not true of the inductee who is processed through Selective Service. In the latter case, the minimum acceptable mental standards are established by law. Recruiting thus assures better quality than does Selective Service.

Because of the enforced lower minimum standards for Selective Service inductees, all three military services prefer to employ their recruiting services whenever possible. In effect, quality is emphasized at the expense of quantity. However, when quantity becomes important to the national welfare, then some reduction in quality must be accepted. Only Selective Service can ensure the delivery of quantity and a reasonable cross section of quality.

A serious defect in volunteer recruiting, aside from its inability to deliver large numbers of men, is its lack of perspective. It is concerned solely with getting men that meet the established standards. There is no thought given to the best use of the man's talents, except within that service, or to the man's importance to his community or to the Nation at large. Selective Service, on the other hand, does consider the needs of the community as well as the armed forces in classifying the men liable for military service. At the armed forces' induction station, the inductee is allocated to one of the three services, based on his mental and physical classification, in accordance with policies established by the three services jointly. Thus, an equitable distribution of the Nation's manpower is achieved on the home front, as well as among the three services.

The use of Selective Service as the exclusive means for securing men for the armed forces does not necessarily abolish or eliminate volunteering. Men or women could still volunteer for service. However, instead of going to a recruiting office, they would report to their local Selective Service board and indicate their desire to

volunteer for early induction. Thus, the flow of manpower into the armed forces would be controlled and balanced. As far as possible, the volunteer's choice of service would govern his initial assignment. Recruiting for members of the regular service would be limited to intraservice activities similar to the recruiting drive within the Army in the fall of 1945.

Selective Service is not only effective in securing manpower for the armed forces but it serves also as a powerful stimulant to support the manpower needs of essential industry. In the past, this impetus has been applied, unfortunately, only to men mentally and physically fit for military service. Faced with a choice of the rigors and hazards of service in the armed forces, or work in essential industry, many men chose industrial jobs. The suasion to contribute to the welfare of the Nation for all individuals liable, under law, for military service should be changed from that of a threat of service in the armed forces to fine and imprisonment. This not only would remove the stigma of punishment attached to military service, but would also reach those individuals who are not acceptable for military service. Some 3,000,000 men out of 17,000,000, examined during World War II, were rejected for military service. Many could still contribute to the Nation's war effort and did, but others, the compulsion of military service having been removed, shirked their duty. Manpower economy requires the maximum effort from the entire manpower pool.

Conclusions

The manpower resources of the United States must be utilized for maximum economy and efficiency.

All initial procurement of manpower for the armed forces should be through Selective Service.

Recruiting for the regular services should be limited to intraservice activities for career personnel.

All persons liable for military service should be required to contribute to the national effort by service either in the armed forces or in essential industry.

The lessons of World War II clearly demonstrated that the preservation of our way of life required the whole-hearted co-operation of industry and the military.

Lieutenant General Anthony C. McAuliffe

COMBAT TELEVISION

Lieutenant Colonel Daniel J. Minahan, Jr., *Artillery*
Instructor, Command and General Staff College

THE recent Kansas City flood disaster inspired one accomplishment of deep military significance. That was the outstanding job done by technicians of WDAF-TV and staff reporters of the *Kansas City Star* in televising the actual scenes of havoc with "on the spot" comments for the benefit of audiences far and near.

By means of cameras located on the roofs of tall office buildings, sweeping views of the raging Kaw and Missouri Rivers and the great, industrial areas were televised. Through the telescopic Summar lens, details of the disaster, such as runaway barges piled up against the crippled Hannibal Bridge, huge fires produced by exploding gas tanks, wreckage and cattle floating downstream, and dikes and levees giving way, were readily picked up and brought into close-range view. The whole broadcast did much to enable overtaxed engineers, firemen, police, and relief workers to estimate quickly where their services were most needed, to inform anxious property owners of impending doom, and to satisfy thousands of the idle curious who would have added to the rampant confusion by their presence.

Television Applied to Military Operations

How could this same television technique be applied in a typical military operation?

The sketch map on page 56 illustrates a situation wherein the Blue 20th Infantry Division is making an assault crossing of the Green River in the face of Red organized defenses on the far shore.

Let us assume that the normal infantry and artillery observation posts, located along the high ground at "A," "B," and "C," are supplemented by television cameras, similarly dug in and camouflaged. From these cameras, coaxial cables extend to the division command post located in the woods at "F." (Cables must be used rather than radio broadcasts in order to prevent enemy interception or jamming.)

Reports submitted by observers describe enemy positions and activity on the far shore, river conditions, cover and concealment, likely crossing sites, and avenues of approach. Concurrently, the division commander and his staff, by means of television receivers located at the command post, actually observe the described conditions and situations along the river valley and on the far shore. These televised scenes not only assist materially in determining the best course of action and scheme of maneuver, but cut down considerably the time required for reconnaissance and planning.

Furthermore—as a boon to the poor observers—traffic to and from the observation posts is eliminated. No longer do parties of staff officers or other groups of observers come barging up to the observation posts in jeeps, or assemble in groups around the observation posts, thereby disclosing their positions.

Once the assault crossing has commenced, the division commander has a quick and accurate means of keeping

abreast of what is happening along the entire division front. It truly can be said that his eyes are everywhere!

Actual Operations

Let us see how it is done. As the attack progresses, the 1st Battalion, 60th Infantry, reports rough going and severe losses because of enemy fire on the attempted crossing at "K." The 2d Battalion, 58th Infantry, reports stream conditions at "N" prevent the control of boat formations, resulting in lack of tactical integrity on the far shore. The 1st Battalion, 58th Infantry, reports meeting little opposition at "M" and that two companies have crossed the river satisfactorily.

Without attempting to assess the accuracy of written or verbal reports, or making time-consuming trips along the front, the division commander or his staff officers see, through the eyes of the television camera, the exact situation as it exists at each battalion crossing site. The commander studies the television screen to determine whether the troubles being encountered are due to improper tactics, overwhelming enemy superiority, or poor leadership and lack of control on the part of subordinate commanders. Noting where success is being achieved, he immediately implements his plans for the exploitation of that success by the division reserve.

The division artillery commander likewise finds valuable information available to him through television and has his own receiver in the division artillery command post at "G." Reports of artillery observers describing targets are supplemented by the actual pictures of what they are describing, thereby increasing the accuracy of target identification and making more apparent the type and quantity of artillery fire required to neutralize or destroy the targets.

Use in Helicopters

Television cameras, lifted vertically in helicopters, in effect "carry" the artillery commander over the high ground comprising hills "P" and "Q" to see what artillery targets lie beyond those areas. Through these cameras, an enemy artillery battery at "O" is picked up readily and taken under fire, and the effect of the fire likewise is observed on the screen. Most harassing or interdictory fires are guaranteed profitable by keeping the target under observation. For example: the critical road junction in enemy territory at "R," and the road extending from "R" to "L," are interdicted only when the enemy attempts to use them in committing his reserves located at "S."

The use of helicopters specifically is suggested instead of divisional light airplanes in order to provide a more stable platform for the television camera. This is desirable particularly when a powerful magnifying lens is used. Furthermore, the use of moving aircraft requires the actual broadcasting of the television beam which is susceptible to enemy interception. The helicopter, however, with its elevator-like characteristics, can be made a very stable camera platform by means of a gyroscopic leveling system. The camera in the helicopter can be connected easily by cable to a ground terminal. Of course, a quick release mechanism must be used to permit the cable to be cast off immediately in the event the helicopter pilot has to take evasive action to avoid enemy aircraft or antiaircraft fire.

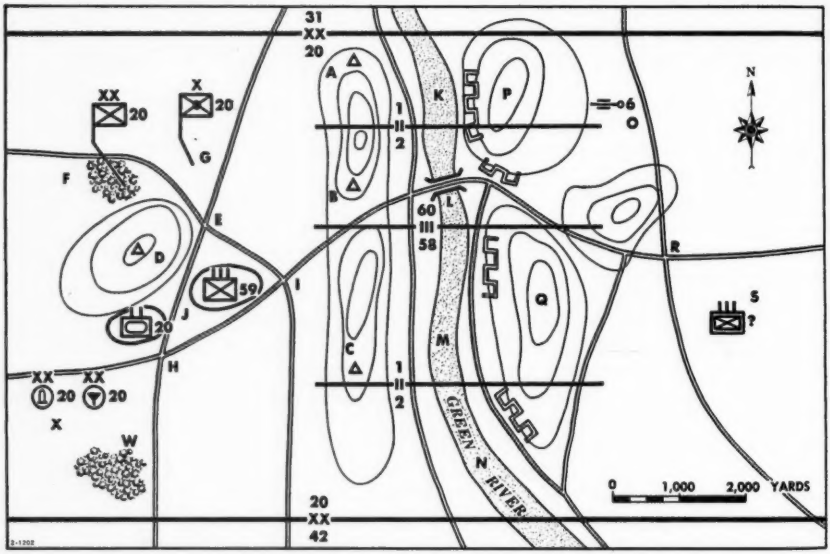
While television will never supplant personal leadership and personally directed action, its employment on the battlefield will add immeasurably to the commander's ability to foresee and influence subsequent actions

Other Uses

Many other applications of television occur throughout the division zone. By means of a helicopter-borne television camera, the division commander, with his division engineer beside him, checks on camouflage discipline and road maintenance. The progress being made on bridge construction at site "L" is observed through the camera at "B." It is not necessary for staff officers or other interested personnel to visit the bridge site to see how things are going, thereby causing congestion in the area and inviting enemy artillery fire; nor is it necessary for the division G3 to keep telephoning the engineer at the bridge site with requests for information on progress. He can look at the television screen and see for himself.

A television camera located on the high ground at "D" would serve many purposes. When the division reserve, located in the vicinity of "J," commences its movement to its prescribed crossing site, the G3 and the G4 can check and observe traffic conditions and can take action to prevent congestion at crossroads "E," "I," or "H." After the bridge at "L" is constructed and in operation, the G4 and the Provost Marshal can observe and regulate traffic conditions at the bridge, and along the main supply route "H" to "L," by means of cameras located at "B" and "D."

Finally, an observer located at "D," with the mission of watching for possible enemy infiltration or airborne activity, upon observing enemy commandos parachuting in the vicinity of the woods at "W," supplements his report to the G3 by a view of what is happening, thereby expediting action to eliminate this threat from the Class III and V installations at "X."



Conclusion

These are just a few of the many practical uses for television within the combat zone. Undoubtedly, many more will become apparent once it is employed. While consideration has been given only to its employment by a division, obviously, it has many possibilities at higher and lower echelons.

The use of television for military purposes undoubtedly will present technical problems. However, it does not appear that such problems will be insurmountable, particularly in view of current progress in the television field.

One must not get the idea, however, that this new device will permit the commander to settle down in an armchair in his command post and, with his staff, control his division by means of telephone calls after he has seen what is going on in the television screen. There still is no substitute for personal leadership and personally directed action. However, by means of television, the tactical commander can see quickly at what particular spot within his command or area of responsibility his personal presence is needed most urgently to ensure the success of the operation.

We in the Department of Defense cannot bet the lives of our troops in the field or our civilian population here at home on weapons that we are not yet able to put into quantity production. We are going to push the development of every device, technique, and weapon that will assure victory in war. To the extent that more effective weapons can be developed, we are determined to have them first, and in greater quantity than any potential enemy.

Secretary of Defense Robert A. Lovett

Feb 1952

Mobilization must provide modern weapons as well as trained men. From a technical viewpoint, the determining factor in modern warfare is the capacity to put metal in motion in the largest amount, with the greatest speed and flexibility, and with the greatest impact, so that it will most effectively limit and reduce an enemy's capacity to accomplish the same ends. With this in mind, every avenue of research must be explored; every imaginative application must be made.

General of the Army Omar N. Bradley

ARMOR *VERSUS* AIRBORNE

Lieutenant Colonel Vernon G. Gilbert, *Artillery*
Instructor, Command and General Staff College

The views expressed in this article are the author's and are not necessarily those of the Department of the Army or the Command and General Staff College.—The Editor.

THE purpose of this article is to discuss the employment of armor in the defense against airborne operations. A large-scale airborne assault that would disrupt our lines of communications, combined with a major ground attack to destroy or capture our army forces, is a situation which our commanders in the field have not yet had to face. Such a situation obviously calls for a diversion of a portion of our forces, preferably armored units, to crush the aggressor airborne force. An enemy airhead can be reduced quickly by the skillful use of our armor.

The Airborne Assault

As background for our discussion, we shall limit our scope here to the strengths and weaknesses of an airborne assault and indicate how the use of armored units against that force must take into consideration those strengths and weaknesses. Our plans for a defense against airborne attack should minimize the effects of airborne strengths and exploit the weaknesses.

THESE ARE THE STRENGTHS:

Flexibility.—An airborne force has the ability to strike at any of several objectives, deep behind or close in to the line of contact.

Surprise.—The speed and capacity of modern aircraft permit the delivery of large numbers of airborne troops with their equipment with little warning and in a short period of time. Included in this strength is the sizable shock effect developed by the suddenness and speed of the attack.

Defense of the airhead.—The airhead has a circular shape, which facilitates the massing of reserves and artillery at threatened spots. Outside of the airhead line, a reconnaissance and security line is established. Defensive positions take full advantage of all suitable tank obstacles.

Air support.—At least local air superiority is a prerequisite to the initial assault. Air power also contributes to the support of the defense of the airhead.

THESE ARE THE WEAKNESSES:

Initial vulnerability.—Airborne troops are extremely vulnerable while they are landing and assembling. A battalion requires from 30 to 60 minutes after landing to organize and be ready for action as a battalion. During this period, troops are effective only as individuals and small units. After this period, the airborne force grows progressively stronger until the en-

tire force occupies an organized defensive position.

Heavy equipment.—Heavy artillery and armor usually are absent from the airhead.

Mobility and fire power.—Once on the ground, airborne units lack transportation and their fire power is more restricted than in conventional ground units.

Characteristics of the Defense

Now that we have examined briefly the strong and weak points of an airborne assault, let us consider them in relation to the characteristics we want our plans and actions to possess in the defense against an airborne attack. First, we want a functioning warning system to neutralize airborne flexibility and surprise. We must obtain accurate, timely information of the enemy's approach and of the area in which he will operate, to include drop zones and landing zones, and of his contemplated action after landing. Then, with this early information and the aid of a continuous flow of intelligence, we can attack immediately with forces locally available to prevent the organization and consolidation of the airborne elements and thus take advantage of the initial period of weakness. In this early phase of our defensive operation, light armored units can provide the warning net and the subsequent flow of information, and light and medium armor can be used to block, attack, disrupt the organization, and isolate airborne elements. These armored units must be superior in mobility, armored protection, and fire power to the airborne units they oppose. The armor is aided, in this respect, by the airborne's inherent lack of heavy equipment, mobility, and fire power as compared with conventional ground units.

So far, then, our plans should provide for the warning of an assault, and the location and isolation of the airborne force. The remainder of the plans for an active defense operation is concerned with the attack to destroy the airborne force. This attack may be made by local forces or by a mobile reserve. It *must* be made without delay, however, before the airborne force can be built up and before the airborne action has so disrupted our movement of supplies that our attack cannot be supported logistically. The attack to destroy the invaders should be supported by antiaircraft artillery units, and the plan of attack closely co-ordinated with our air force to neutralize enemy air superiority.

Armored Units

Next, we shall consider existing armored units, and how we can utilize them to conduct the defense against airborne attack. Warning and information can be provided by the light armored battalion and the light armored regiment (armored cavalry regiment). These units are organized, trained, and equipped for reconnaissance, security, and short-period combat missions. With their light and medium armored protection, multiple means of communication, and fire power, they can locate the airborne main effort, report it, and conduct limited offensive operations to destroy small airborne groups, disrupt movement, and isolate larger airborne units, delaying their movement toward airborne objectives.

Light and medium armored units, because of their mobility and fire power, provide ideal weapons to disrupt enemy airborne attacks. Their use should be integrated into a warning system and area defense plans

The attack to destroy a large airborne force can be conducted by armored units

such as one or more armored divisions, reinforced with antiaircraft artillery and engineers. The armored division, with its flexibility of organization, armored protection, and controlled fire power, can be used as a nucleus for the mobile reserve to conduct the attack to destroy the airborne force.

Timing of Attacks

Local forces, naturally, to include service and antiaircraft artillery units, will be the first to be involved in an enemy

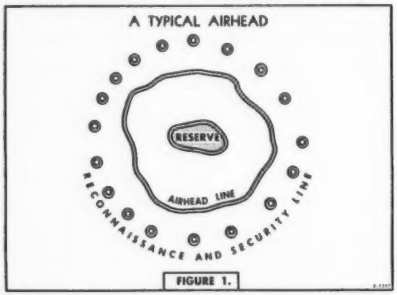


FIGURE 1.

airborne assault. These local units should attack immediately, if only small airborne units drop or land in their vicinity. However, their actions should be limited to the defense of their installations and critical terrain features in their vicinity, if the airborne force in the area has overwhelming superiority and an attack would have no chance of success.

Mobile reconnaissance (light armored) units in the area transmit flash reports of the airborne attack, and operate to locate the airborne main effort and report it. If the airborne force is small, these light armored units attack at once to disrupt their organization, to prevent their movement, and to isolate the invader. If the airborne force is so large that an attack would have no chance of success, the local mobile reconnaissance force maintains contact with the airborne elements, conducts a delaying action, and co-ordinates and assists other local units in the defense of installations and critical terrain features.

The mobile reserve, preferably one or more armored divisions, reinforced with antiaircraft artillery and engineers, attacks without delay under one or more of the following conditions:

1. The location of the enemy airborne assault is nearby (within a few hours march).

2. Cross-country movement, or movement over concealed and covered routes, is feasible as protection against air attack.

3. Protection against enemy air attack can be provided by our air force.

The mobile reserve may defer its attack until early the following day under these conditions:

1. The location of the airborne assault is several hours marching distance away.

2. The enemy air force has general air superiority and our air force cannot provide air defense for a movement in daylight.

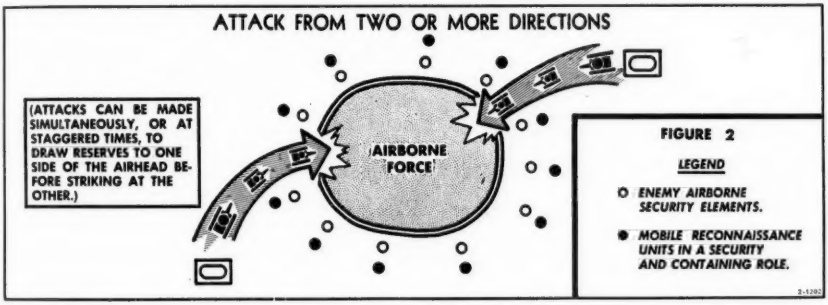
3. Cross-country movement to the objective area is not feasible, and the mobile reserve must move on exposed routes and be subject to heavy losses from air attack while moving.

Conduct of the Attack

Speed and aggressiveness characterize the attack against an enemy airhead. An armored attack, conducted quickly and vigorously, capitalizes on that period when the airborne forces are weakest and the armored unit is exposed to air attack for a minimum period of time. Also, speed in the attack takes advantage of the airborne forces' restricted mobility. All friendly forces in the area, both service and combat, should be used during the attack of the mobile reserve to ensure success.

Comparative strengths and terrain permitting, the mobile reserve should attack from two or more directions against the

enemy airhead. Compared with a main effort along one axis, an attack from two or more directions has several advantages. It provides maximum protection against enemy air attack by affording sufficient area for dispersion. It minimizes the airborne forces' ability to mass defensive combat power at a threatened point on the airhead line. It utilizes fully the control capability of armored units, and should have a greater demoralizing effect because of the presence of tanks on two or more sides of the airhead.


ATTACK FROM TWO OR MORE DIRECTIONS
(ATTACKS CAN BE MADE SIMULTANEOUSLY, OR AT STAGGERED TIMES, TO DRAW RESERVES TO ONE SIDE OF THE AIRHEAD BEFORE STRIKING AT THE OTHER.)
AIRBORNE FORCE
FIGURE 2
LEGEND
ENEMY AIRBORNE SECURITY ELEMENTS.
MOBILE RECONNAISSANCE UNITS IN A SECURITY AND CONTAINING ROLE.

Unity of Command

Unity of command should build up progressively with the arrival of friendly units in the area. Initially, the defense should be co-ordinated by the local area commander responsible for the integration of local installation plans with area plans for defense. The first ground action is taken by local combat and service troops. The mobile reconnaissance unit commander should take command of all local forces in the area on the arrival of his unit. The mobile reserve commander takes command of all effective friendly forces in the area on the arrival of his unit. Unity of effort in the action is a prerequisite to the successful destruction of the enemy airborne force.

Air Support

During the conduct of the defense, air support may not be available because of the air situation. When the enemy has air superiority, the friendly air force concentrates on a counterair effort. However, even if the enemy has general air superiority, close air support *can* be provided if the mission of the mobile reserve is of sufficient importance to the over-all mission of the army-tactical air force team.

The armored commander must be prepared to accept losses in an attack to destroy an airhead. However, losses from enemy air attack can be reduced by the adoption of the following measures:

1. Use of concealed routes or cross-country movement.

2. Dispersion and attack from two or more directions.

3. Speed and vigor in a co-ordinated attack to expose armored forces for a minimum time.

4. Reinforcement with mobile antiaircraft artillery units.

5. Co-ordination between the friendly air force and the ground commander.

Summary

In summary, these are the highlights which this article has stressed in the employment of armored units against an enemy airborne operation:

1. Integrate armored cavalry (light armored) units into the organization of a

warning system and an area defense plan.

2. Use reinforced armored cavalry (light armored) units or armored divisions as the nucleus for the mobile reserve.

3. Establish unity of command over all friendly units in the area of the assault. Invest this command in the commander of the largest tactical unit present.

4. Conduct the attack with speed and vigor; the earlier the attack the better will be its effect.

5. When relative strengths and terrain permit, attack from two or more directions.

NEXT MONTH

Main Articles

Sea Power: Abstraction or Asset? by Walter Millis; and *Conflict of Command in the Red Army, 1918-1942* by Dr. Littleton B. Atkinson are included among the main articles.

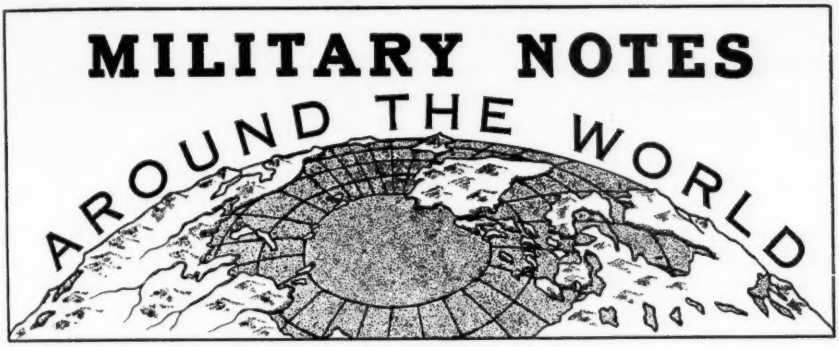
Foreign Military Digests

The foreign digests include "The Psychology of the Russian Soldier" from *Allgemeine Schweizerische Militarzeitschrift* (Switzerland); and "Army in Africa" from the *Journal of the Royal United Service Institution* (Great Britain).

Books for the Military Reader

Reviews of *The East European Revolution* by Hugh Seton-Watson; and *The Other Side of the Hill* by B. H. Liddell Hart are included.

MILITARY NOTES AROUND THE WORLD



UNITED STATES

Flight Simulator

Future *F-86D Sabre* jet pilots will "shoot down" their first enemy planes without actually seeing the enemy or even leaving the ground. It is all a matter of electronics in the latest device for precombat training of Air Force fighter pilots.

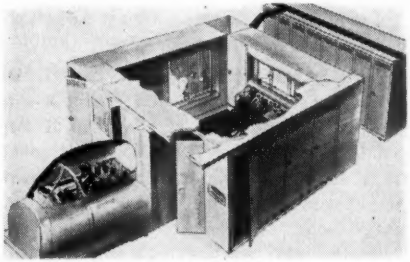
This latest step in pilot training was revealed with the successful completion of tests of the *F-86D Sabre* flight simulator.

The new simulator, a 35,000-pound package of metal, wiring, electronic tubes, radar scopes, and servo mechanisms, is the first to combine the simulation of two planes—the one being flown and an approaching enemy plane. Thus, the future jet fighter pilot will not only learn how to handle his plane without taking it off the ground, but also how to bag an enemy plane as it approaches him at the speed of sound.

The new electro-mechanical trainer contains more than 100,000 parts, including 1,152 electronic tubes and 60 miles of wiring. It takes up 600 feet of floor space and stands 10 feet high.

Its cockpit will duplicate in every detail that of the *F-86D Sabre*. Heart of the trainer, and separate from the cockpit, is a battery of analogue computers, which provide the answers to how the pilot "flew the plane." If the pilot makes a mistake, the computers automatically change the cockpit instrument readings to conform to the actual conditions.

The simulator requires two instructors, one for flight performance and the other for radar operations. The latter also controls the simulated target which the pilot is required to attack.



The Air Force's new *F-86D* flight simulator.

The instructors can put the trainee-pilot through every imaginable set of emergency circumstances; and the beauty of it all is the fact that the pilot can make a mistake that would be fatal were he actually flying, and live to learn better. By going through the same routine again and again, he can learn how to correct his error. Thus, he can be trained to react automatically to all situations by repeated on-the-ground test flights.—News release.

Improve Diesel Fuel

The Navy is testing a new chemical compound designed to raise the quality of Diesel fuel to Navy requirements without the refining now necessary. If successful, the compound will greatly increase the amount of fuel oil available for submarines and other Diesel vessels without added strain on the Nation's oil refineries.—*Army Navy Air Force Journal.*

One-Man Rocket 'Copter

A rocket helicopter that can be strapped on the back of a man and shoot him straight up into space in true science fiction fashion is being tested by the Navy.

This fantastic new machine weighs 100 pounds and can be parked in a space no larger than the top of a desk. It is designed to carry one man and special armament at a rate of climb never considered possible for a helicopter. Just how powerful it is, or how fast and high it will climb, is classified information.

This is the way it works: Liquid fuel rockets, self-starting and throttle-controlled, are mounted in the tips of two small rotor blades. The rotor is attached to a small tube which curves downward to support fuel tanks, a pilot's seat, and cargo hook. A tube extending backward from the rotor hub carries a small rudder, and another extending forward and down is the pilot's control column.

Ground tests for this weird little machine, known as the *Pinwheel*, were begun recently at a military base near Los Angeles. The *Pinwheel* can land and take off in areas which heretofore have been inaccessible to aircraft. With the power shut off, it can glide like an airplane or descend vertically like a parachute. Its rocket motors display no flame, and in approaching an enemy location at night, it would be barely possible to spot the machine and the pilot.—*Armed Force.*

Women's ROTC

A women's ROTC may be set up soon in the Nation's colleges.

A new bill pending before the House Armed Services Committee would authorize participation by women in the ROTC program for the first time. At least one staff study has been made on the subject by the Army and it is believed that Army personnel officials are favorable to the idea. At least one college has sent in a plan for co-ordinating women into the ROTC program and several colleges have written the Department of Defense about the idea.—*Science News Letter.*

Homing Guide

Experiments recently conducted at The Artillery School, Fort Sill, Oklahoma, indicate that radar can give substantial aid in guiding relief aircraft to encircled combat units. The radar vectors helicopters over the area held by the encircled unit so that supplies can be dropped accurately by night or day.

The distance and direction to the drop zone from the radar must be known, and radio communication between helicopter and radar must be maintained. Commands given by radar personnel guide the pilot to the drop zone.—*Combat Forces Journal.*

New Battery Developed

The Signal Corps has developed a new dry battery which substitutes plentiful low-grade domestic manganese dioxide for the high-grade product found in sufficient quantity only on the African Gold Coast. The Army said that the new batteries will last twice as long as those now in use.

While manufacture of the new battery is expected to be slightly more costly than present batteries, substantial economies will result from its doubled life and from the reduction in storage and shipping costs.—*Armed Force.*

Reduce Spark Plug Fouling

Safer, more efficient operation of airplane engines and elimination of most costs and delays caused by failure of aircraft spark plugs may be made possible by a new aviation gasoline ingredient which has been developed.

The new product virtually eliminates spark plug fouling, long a major headache of airplane maintenance.

Spark plug fouling, or failure to fire, is caused by gradually accumulating deposits that electrically conduct across insulated parts of the spark plug, short-circuiting it. A short-circuited plug does not fire. This results in power loss for the engine. If both plugs in a cylinder cease firing, serious engine vibrations may be set up.

The new ingredient reduces fouling by changing the nature of the deposits so that they do not become conductive.—*American Helicopter.*

Air National Guard Units

States whose Air National Guard organizations have been ordered into active military service have been authorized to organize temporary units to prepare for the return of the permanent units to state control.

The interim organizations, to be activated at each Air National Guard base 6 months prior to the permanent unit's return, will recruit and train new members and receive and store equipment for the units completing their active tours.

Since enlistment periods for many Air National Guard personnel will expire while they are in active service, the cadre units will be authorized to recruit up to 25 percent of the present authorized strength of the permanent units.

As soon as practicable after the return of the permanent units, the personnel of the temporary units will be absorbed into the permanent organization.—News release.

Ground-Support Plane

A small, lightweight plane, designed specifically as an air-to-ground weapon, has been built by the Fletcher Aviation Corporation. Known as the *FD-25 Defender*, the plane is smaller than many light planes (30 foot span and 21 foot length) and shows remarkable agility in the tree-top level operations required by close air-ground support. It has a speed range of 35 to 182 miles an hour, a cruising range of 630 miles, and a take-off and landing distance (to clear a 50-foot obstacle) of 600 and 625 feet respectively.

The versatile, hard-hitting *Defender*.

The striking power packed by the *Defender* is out of all proportion to the size and weight of the plane in light of present accepted practice. Three alternate rocket loading combinations are made up with 40 2.75-inch rockets in banded bundles, 32 2.75-inch rockets in special launchers, or 4 5-inch rockets. As an added alternate, the *Defender* carries two 40-gallon napalm bombs or two 250-pound general purpose bombs. The plane's fixed armament consists of two .30-caliber guns, each served by 1,000 rounds of ammunition.—News release.

Weapons Agreement

The United States has agreed to sell American military equipment to the Union of South Africa. The equipment will be sold under the Mutual Security Program approved by Congress.—News release.

Armory Construction

The Army plans to build armories in 13 cities throughout the country, as part of a long-range program designed to establish facilities for reserve units. The armories will cost about 4 million dollars.—*Armed Force.*

X-Ray Energy Measurements

A "hot lead" technique now can be used to measure X-ray energy in terms of standard heat measurements of energy instead of by indirect measurements through secondary phenomena.

The method measures the rays' heating effects on a block of lead, and gives precise measurements. It can be used on X-rays of energies from 400,000 volts, used in conventional medical X-ray treatments, up to 340,000,000 volts.

Although physicists term the new method a "hot lead" technique, the actual temperature rise is no more than one-tenth of a degree. The small temperature increases are measured by a thermistor, a new type of heat-measuring device which is 10 times as sensitive as older resistance thermometers. It is embedded in the lead.—*Science News Letter.*

World's Loudest Noise

A super-powerful air raid siren with a 140-horsepower unit that produces the loudest sustained noise ever designed has been developed for use by the Air Force outside the continental limits of this country.

The first of four projected sirens was delivered to the Air Force recently after a demonstration that disclosed that the mechanism throws a warning 7½ miles under normal atmospheric conditions.

The entire siren, including the engine, horn unit, and frame and base, weighs nearly 5,100 pounds. It makes one complete revolution on its base every minute, thus making it audible in a circular area with a 15-mile diameter.—*Armed Force.*

Portable Launching Frame

Rocket bombs used on the battlefield are easily carried and launched directly from a combination packing box and launching frame, which holds three of the missiles.

The packing case is a flat box-like device, made of wood or other lightweight material, within which is an extra base of frame design hinged to the true base at one end. This frame holds the rockets. When the box is flat on the ground, the frame can be turned upward to any angle desired. Props hinged to its lower surface have ends that fit into holes on the sides of the box and hold the frame at the correct tilt. A crosspiece at the rear end of the rockets carries a pair of electrical contacts for each rocket.—*Science News Letter.*

Navy Aircraft

Although exact figures of the number of new Navy planes in production, or coming off the production lines, are not releasable, the following is a list of planes and other aircraft now being procured from current production, or which, it is expected, will be procured later in fiscal 1952:

Douglas, *AD Skyraider, F3D Skyknight, F4D Skyray,* and *R6D Liftmaster*; Grumman, *AF Guardian, F9F Panther,* and *UF Albatross*; McDonnell, *F2H Banshee* and *F3H Demon*; North American, *AJ Savage* and *FJ* (not named); Chance Vought, *F7U Cutlass*; Lockheed, *P2V Neptune, R70 Constellation,* and *TO2 Shooting Star*; Martin, *P5M Marlin;* Convair, *R3Y* (not named); and Fairchild, *R4Q Packet.*

Helicopters include: Piasecki, *HUP Retriever*; Hiller, *HTE* (not named); Kaman, *HOK* (not named); Bell, *HTL* (not named); and Sikorsky, *HO5S* (not named) and *HRS* (not named).

In addition, the Navy is using the *ZP4K* blimp produced by Goodyear.—*Army Navy Air Force Register.*

World's Fastest Duo

The fastest known bomber and fighter in the world—the Boeing *B-47 Stratojet* and the North American *F-86 Sabre*—are seen together in flight for the first time in this just-released photograph. The *Stratojet*, weighing 185,000 pounds and capable of speeds of more than 600 miles an hour, is powered by six *J-47* engines. The *Sabre*, which has proved more than a match for the *MiG-15* over Korea, is powered by one of the same type engines. The *F-86 Sabre* holds the official world's speed record at more than 670 miles an hour.

Electric Throttle

An electric throttle has been developed which permits a motorist to maintain a constant speed without keeping his foot on the accelerator. The heart of the throttle is a solenoid mounted between the carburetor and the accelerator linkage. A toe switch is installed on the floorboard and an electrical connection is made with a switch on the brake. When the driver attains the desired speed, he presses the toe switch and the throttle automatically is held in position. To resume foot-control, he trips the toe switch again. If the brake pedal is depressed, the throttle is instantly released.—*Popular Mechanics Magazine.*

Controls for Ocean Liners

Ocean liners, like airplane transports, are now controlled in part by automatic devices, but by 1960 they are expected to be robot controlled from bridge to keel.

Electronic developments in marine design will usher in this age of automatic ships. Included among these developments will be automatic navigation devices, automatic boiler controls, master controls for propulsion machinery, and sensitive climate control for passengers, crews, and cargo.

Crews will be somewhat smaller, but more efficient as the robot devices will better the performances of manually manned ships.—*Science News Letter.*

Speed Broken Bone Healing

Broken bones can be set faster, the period of pain and discomfort for the patient is shorter, and recovery comes sooner when a chemical called hyaluronidase is injected.

The chemical, an enzyme known also as the "spreading factor," permits rapid diffusion of liquids through the body because of its ability to break down hyaluronic acid, an important component in the jelly-like mass which holds cells together in tissue.

In the case of broken bones, it acts to reduce pain and swelling quickly by causing wide dispersion of the edema fluid and the accumulation of blood, seen by the patient as black and blue spots. As a result, a snug fitting cast can be put on at once, instead of after a period of waiting for the swelling to go down.—*Science News Letter.*

New Packaging Aid Developed

A plastic shroud which is only eight-thousandths of an inch thick, and which can withstand extreme climatic conditions, has been developed by the Army Ordnance Corps to protect shipments of military materials.

This means that scarce and costly canvas tarpaulins, wooden boxes, and crates, now used in shipping, can be replaced, with a saving of money and labor to the Army.

A vinyl chloride shroud large enough to cover a machine weighing 20,000 pounds weighs only 30 pounds, while a waterproof tarpaulin of the conventional type would be many times heavier and much more expensive.

Tests show that the new cover is unharmed by winds up to 60 miles an hour, and can withstand temperatures ranging from subzero to higher than 95 degrees. This cover can be used successfully to protect flatcar shipments of heavy war material as well as equipment stored for long periods outdoors.—*Armed Force.*

UNION OF SOUTH AFRICA

Air Service

Direct air service was established recently between Johannesburg, Union of South Africa, and Frankfurt, Germany. This is the first direct contact between the two countries since World War II.—Union of South Africa Government Information Office.

WESTERN GERMANY

Oil Production

Western Germany, formerly the biggest petroleum producer in Western Europe, expects her oil production to be 4¼ times the prewar rate by the end of this year.—*The New York Times.*

Trade Treaties

The Allied High Commission has announced that Western Germany no longer needs to submit for scrutiny trade treaties signed with Western countries. However, the allies still will check treaties signed with Communist-dominated countries and retain their right to veto them.—News release.

UGANDA

Airfield Opened

Africa's largest airfield, capable of handling the latest jet planes, was opened recently at Entebbe, Uganda. The new field, the longest runway of which measures 10,300 feet, will provide a new link in the British Commonwealth's strategic air chain.—News release.

NORTH ATLANTIC TREATY NATIONS

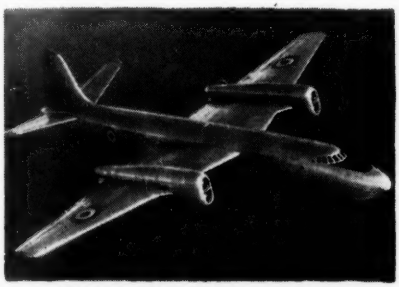
Travel Requirements

Soldiers and civilians of North Atlantic Treaty Organization countries traveling on a duty status in other treaty lands will not be required to carry passports and visas under a recent agreement by the Atlantic Council of Deputies.—News release.

GREAT BRITAIN

Jet Bomber

Another addition to Britain's array of new jet aircraft recently completed its first flight. Designated the *SA/4*, the new long-range, high-level bomber is powered by four *Avon* engines and carries a crew



Britain's new *SA/4* four-jet bomber.

of five. Performance data on the plane have not been released.

One of the unusual features of the plane is the positioning of the two engines on each wing, mounted together vertically. This mounting has the advantage of providing good accessibility for maintenance and of allowing for the substitution of later types of engines without alteration to the primary structure. It also provides a further gain because of the improved air intake efficiency.—News release.

Flying-Boat Transport

Work is almost finished on Britain's huge new flying boat, the 140-ton *Princess*, due to go into service with the RAF as a troop carrier. The giant aircraft, one of three being built, will be able to fly 200 men nonstop for a distance of 3,500 miles, and will be capable of doing in a year the work of three normal-size troopships. The *Princess*, originally intended as a civilian airliner, is powered by 10 *Proteus* turboprop engines.—British Information Services.

Ambulance/Freighter

One of the latest in the prolific series of light planes produced in Britain is the Auster *Ambulance/Freighter*. The new plane, powered by a 180-horsepower engine, is designed for use as an aerial am-

Above, the *Ambulance/Freighter* in flight. Below, the plane used as an ambulance.

bulance, as a freighter, or as a four-seat liaison or passenger aircraft.

The plane has a span of 37 feet and a length of 24 feet 8 inches. It has a 300-mile range and a maximum cruising speed of 105 miles an hour.—News release.

Salvage Effort

Attempts to salvage the British submarine *Affray*, which made a fatal dive in the English Channel in April 1951, were abandoned recently. The submarine, with 75 men aboard, was located in 288 feet of water after a 2-month search.—*The New York Times.*

BRAZIL

Rehabilitation Projects

The Brazilian Finance Minister has asked Congress for 10 billion cruzeiros (540 million dollars) to finance projects recommended by the joint Brazilian-United States Economic Commission. These include railway equipment, shipping facilities, hydroelectric plants, and agricultural and industrial developments.—*The New York Times.*

Naval Base Expansion

The Brazilian naval base of Aratu is to be transformed into the biggest base in South America. This project is part of the plan to modernize the Brazilian fleet and naval services (MILITARY REVIEW, Aug 1951, p. 70).—News release.

KOREA

Hot Showers

Combat soldiers in Korean front areas now can get outdoor shower baths with sterilized warm water with the aid of a mobile trailer unit that can be towed by a jeep. Any local water supply may be used.

This small, two-wheel trailer (total weight less than 2 tons) picks up water from a nearby river or tepid pond, heats it to a scalding temperature to kill germs and other organisms, cools it to a comfortable bathing temperature, and delivers it to 24 shower heads for the bathers.

A gasoline engine is used to pump the water and deliver it to the shower jets. Oil normally is used for fuel for the heating unit that does the sterilization, however, any type of liquid fuel can be substituted. It requires approximately 14 gallons of fuel an hour. The device delivers water to the showers at a rate of 43 gallons a minute. Shower facilities are ready for use about 20 minutes after the trailer unit is parked beside the water supply.—*Science News Letter.*

AUSTRALIA

Wage Earning Population

The number of wage earners in Australia has reached the record total of 2,630,000. This figure does not include wage earners in rural industry, women in private domestic service, or members of the country's armed forces.—*Australian Weekly Review.*

Army Recruiting Program

The failure of the Australian Army's recruiting campaign at home has forced it again to seek more personnel from Great Britain.

Some 3,000 British ex-servicemen already have been recruited in Great Britain for service in the Australian Army, which now is looking for officer personnel as well.

According to an announcement by the Army Minister, Australia plans to recruit 100 former British Army officers to help alleviate a 20 percent shortage of officers in that country.—News release.

Paratroop Training

The first paratroopers trained in Australia since the war graduated recently from the School of Land-Air Warfare at Williamtown, New South Wales. These men, along with another group still in training, will form the nucleus of a large paratroop organization which can be expanded rapidly in the event of an emergency.—*Australian Weekly Review.*

DENMARK

Defense Strength

Denmark's Foreign Minister recently announced that that country expects to have a defense strength of at least 225,000 by the end of the year. This figure will include an Army of 100,000, a Navy of 25,000, an Air Defense force of 15,000, a Local Defense force of 20,000, and Home Defense forces of 50,000.—Danish Information Office.

ITALY

Production Plan

A 5-year plan to stimulate production and combat unemployment is being worked out by the Ministries of Industry and Commerce, Agriculture, Public Works, Transport, and Merchant Marine. The project calls for the expenditure in the next 5 years of about 800 million dollars to revitalize those sectors of the Italian economy that would respond most readily to capital investments.—*The New York Times.*

THE NETHERLANDS

Armed Forces

By the end of 1954, the Netherlands expects to have its armed forces increased to the strengths listed below:

Army: five front-line divisions, organized into one army corps and two separate divisions. In addition to these units, which in time of war will come under the command of the Supreme Allied Commander, Europe, plans provide for a number of troops to safeguard the lines of communications for the operational forces and defend vulnerable points in the Netherlands against any attack.

Air Force: 21 fighter squadrons, as well as a number of reconnaissance, liaison, and transport squadrons. The fighter squadrons will be equipped with *Thunderjets* and *Meteors.*

Navy: 1 aircraft carrier, 2 light cruisers, 12 destroyers, 6 destroyer escorts, 4 submarines, 48 minesweepers, about 100 aircraft, and a number of patrol and auxiliary vessels.—The Netherlands Information Service.

BURMA

Nationalizing Oil Industry

Burma intends to nationalize her oil industry, but she will do it in an orderly manner by slow stages. The nationalization of the oil industry will be accomplished through purchase rather than confiscation.—News release.

BELGIUM

Defense Budget

Belgium will spend 488 million dollars on defense this year, according to an announcement by the Finance Minister. The defense budget is 26.6 percent of the overall budget.—News release.

PAKISTAN

Atomic Research Laboratory

An atomic research laboratory is being set up in Lahore, Punjab Province, according to a recent announcement by the Pakistani Government. Orders have been placed with a Dutch concern for part of the equipment for the laboratory, which is expected to be completed late this year.—News release.

SPAIN

Atomic Commission

The Spanish Government announced recently that it had set up an atomic commission, headed by the Chief of Spain's General Staff, to develop peaceful uses for atomic energy in that country.—News release.

ICELAND

Production Loan

The International Bank for Reconstruction and Development has granted Iceland a million dollar loan to help her step up her agricultural production. The funds will finance imports of materials needed to build or modernize farms and improve grasslands.—News release.

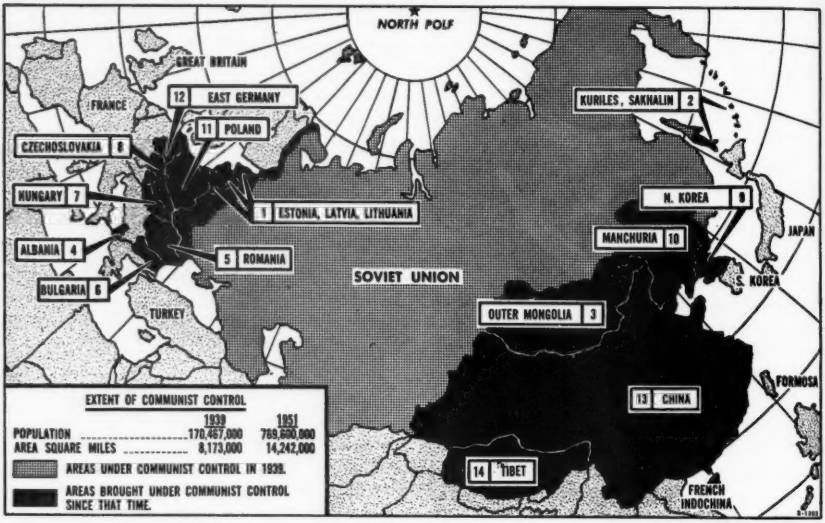
BOLIVIA

United States Loan

The United States Export-Import Bank has advanced 1 million dollars to expand tungsten production in Bolivia. In return for the loan, the Bolsa Negra mine east of La Paz will sell to the United States Emergency Procurement Service the tungsten it produces between January 1952 and December 1956.—News release.

USSR

What the Soviet Union Has Gained—1939 to 1951



CANADA

Canadian Arms Purchases

Canada's Deputy Minister of Defense Production has announced that the United States is planning a big expansion in Canadian arms purchases.

He also disclosed that two major barriers to increased arms sales to the United States now had been partly overcome. These were high United States tariffs on Canadian-manufactured armament and the Buy American Act of 1934, which limited the amount of armament the United States fighting forces could buy from Canada and other countries.

Making public figures that the department had hitherto kept secret, he estimated that while over a 15-month period the Canadian Government had placed 500 million dollars worth of contracts in the United States, the United States Government's orders in Canada amounted to only 95 million dollars.—News release.

THAILAND

United States Frigates

The Royal Thailand Navy recently received two frigates—the *Glendale* and the *Gallup*—from the United States Navy.—News release.

Radiotelegraph Link

Direct radiotelegraph service was established recently between Thailand and the United States. Previously, communications between the two countries were handled via the Philippine Islands.—*The New York Times.*

JAPAN

United States Installation

The United States Navy is building a 2½ million dollar communications depot near Yokohama, the first such project started since the signing of a United States-Japan security pact in September 1951.—News release.

The Necessity for Mountain Training

Translated and digested by the MILITARY REVIEW from an article in "Allgemeine Schweizerische Militarzeitschrift" (Switzerland) August 1951.

IN WEIGHING the question of what type of special training is necessary for our Army, we must start with the premise that the Army must be trained for action in any section of our country. Both the Commission of National Defense and our National Administration have expressed themselves unmistakably, on various occasions, to the effect that our Army must be able to fight on the plains, in the Jura, in the Lower Alps, or in the high mountains. It is understandable, in view of the terrain configuration of our country, and the military and political significance of its various areas, that the defense of our Mittelland area is in the foreground, and that, primarily, that type of training is necessary that will render our forces capable of action in this area.

Mountain Defense Is Important

Our entire training is shaped in accordance with this requirement. Our armament, also, is adapted to the requirements of the Mittelland defense. First place in our over-all training, alongside of antiaircraft defense, is quite properly accorded to antitank defense and the schooling of our ground forces in mobile maneuvers.

We must, however, realize that our men need to be able to operate in the defense of our country in areas other than the Mittelland. Thus, it also is necessary to train our Army for defense on our mountain fronts. Even though we understand clearly that mountain warfare is neither of primary significance nor of a decisive character, the idea that mountain warfare is but an incidental matter is erroneous. Such a concept must be rejected because of our own particular conditions. Our entire southern and eastern frontiers are of a pronounced mountainous character. The experiences of the last war, in Italy, teach, moreover, that fighting in a terrain corresponding to our Lower Alps imposes the hardships and difficulties of mountain warfare on troops.

North-South Axis Over the Alps

In the event of a war in Western Europe, the north-south axis over the Alps will be of great significance, for the routes between the West German area and the Mediterranean are of vital importance to both belligerent parties. Complete security of these lines of communications is assured only to the one who controls the Western Alps. And whoever wages war on us, to force the Swiss people to their knees, also will have to take control of the Alps. By recognizing this fact, it becomes

clear that our Army must be trained and ready for employment in the mountains.

Weighing the Military Requirements

It is often stated that this fitness already exists, because our country has at its disposal a large number of mountain experts and skiers. However, such statements are not sound. There exist several major differences between the requirements of civilian mountain activities and skiing and those required for mountain warfare. He who believes and maintains that the availability of thousands of mountain experts and skiers suffices for our preparedness for military operations in the mountains is drawing a false conclusion. He is like those who were stating that we were a nation of marksmen and, therefore, needed no weapons training for combat. He who assumes that we can fall back on the civilian mountain requirements for our troops for mountain warfare is voting for improvisation, which, today, is definitely refused recognition in all training branches of the Army. It is one of the greatest lessons of war, as learned in both World War II theaters, as well as in Korea. Nothing can be improvised for combat in difficult terrain, and so far all improvisations have failed in the mountains.

We must realize the significance of this lesson. It is not enough to organize and equip a force for mountain combat; it must receive specialized mountain training, because the requirements for mountain warfare are many and varied.

Summary

In summary, it may be stated that our Army needs constant and consistent mountain training. This comprises both mountain refresher courses as well as occasional mountain maneuvers. It also includes voluntary courses in mountain warfare, as valuable complementary training.

Only through mountain training on a broad scale will our Army's fitness for that form of combat be assured.

The Soviet Union's Aircraft Industry

Digested by the MILITARY REVIEW from an article in "Aviation Age" (United States) July 1951.

How big and how good is the Soviet aircraft industry? What is its ability to support an all-out war effort? To these $64 questions, the full answers probably lie locked in secret files in Moscow. However, rather general information can be obtained empirically by considering a number of factors upon which the production of airplanes and other war implements must necessarily draw.

Industry at Half Capacity

The sprawling, decentralized Soviet aircraft industry is probably operating at somewhat less than half its potential capacity. This potential has been estimated by economists and industrial experts in the United States from a low of 50,000 planes a year to as high as 100,000 aircraft a year by 1960, barring all-out war. We are inclined to believe that the latter figure is exceedingly high, allowing even for substantial satellite contributions. The lower figure is well within the bounds of reason, because the Soviets turned out 40,000 planes a year at the peak of their World War II effort.

The industry is represented, according to the best unofficial information, by 25 to 28 major airframe plants, between 12 to 15 power plant factories, and possibly some 40 odd makers of component parts.

A large but indeterminate number of small units, camps, and "farms" contribute directly and indirectly. However, because of the wide use of slave labor and "emigrant workers" from Germany and other countries, probably just a handful

Soviet aircraft workers—men and women—inspecting carburetors on an assembly line.

of top officials actually know how many workers build airplanes.

Trust System

Production is controlled through what appears to be a fairly efficient system of trusts, or combines. The Electro Trust produces, through its string of plants, such items as radio, radar, electronic tubes, lights, and wiring. The Fine Mechanics Trust turns out aircraft instruments of all types, including optical items, gun sights, and bomb sights. Ordnance, ammunition, armor, and similar matériel come through the Arms Trust. The Rubber Trust contributes tires, fuel cells, tubing, and fittings of various types. All power plant procurement is controlled by the engine trust known as the Scientific Motor Institute. In peacetime, only the latter normally is devoted completely to aviation production; but only the Politburo knows whether or not the Soviet considers itself "at war" today.

Manpower Drafted

The great emphasis on things military, at the expense of decent living essentials such as shoes and stockings, is revealed by the details of the recently completed fourth (1946-50) 5-Year Plan. And the fact that the Soviets are drafting several hundred thousand youths (boys at 14, girls at 15) each year for compulsory vocational training certainly belies Communist peace propaganda. The Government specifies the trades into which these trainees must serve their apprenticeships, and tells them where to work after the training period is completed. Manpower is allotted by the Central Workers Registry in a totally ruthless manner, and the penalties for shifting jobs, absenteeism, or tardiness are stiff indeed. The manner in which labor is handled within the various plants will be examined later.

For the training of personnel such as supervisors and foremen, the Soviets set up, in 1947, an Academy of Aircraft Industry. They apparently have discovered that the civilian labor force is not limitless as the propagandists are wont to claim, and that improved supervision is

A World War II photo showing the final assembly line of a Soviet aircraft plant.

required to make more efficient use of the available labor force.

Hands Now, Machines Later

There are two ways in which large-scale production can be achieved. One method is by a high degree of mechanization. The other, admittedly less efficient, is simply to put a lot of people on the job. Lacking the machine tools and most of the techniques she would require to match a war-mobilized United States industry, the Soviet Union has put to work hundreds of thousands of hands. By the use of

techniques such as the "hole-production" method, or other industrial devices, the Soviet Union appears to have departmentalized work so that semiskilled men and women can now produce airframes and small components. Proportionately fewer better-trained workers supervise the mating and the more intricate installations, while highly skilled personnel conduct the finishing and inspection processes.

To understand how well such a system works under pressure, we need only to consider our own wartime experience. For example, Curtiss-Wright operated two plants in the St. Louis area. The East Plant was manned almost exclusively by hurriedly imported sharecroppers and cotton-field workers. This personnel was supplied with highly simplified production drawings and simple tools: one of these was a "torque wrench" that broke in half in the event that the worker applied too much muscle to a critical fitting. Under careful, sympathetic supervision, these workers soon were approaching the output of the other Curtiss-Wright plant which was manned by better trained machine-conscious personnel. Later on, the East Plant actually matched the output of the more skilled factory.

New Machines

In the meantime, however, the Soviets probably hope to make such techniques less necessary by catching up technologically. They produced some 2,300 machine tools in 1950, compared with an output of about 500 in 1940. As German loot, the Soviets obtained at least two of the huge Wotan hydraulic die-forging presses. A report published in Switzerland more than a year ago stated that as early as 1949 the Soviets had in operation 150 of these presses, and were using the majority of them to make aircraft parts. (During the war, the Wotan press could turn out in a single operation the full set of spar components for a *Ju-88* fighter bomber.) For sheer size and capacity, the United States is just beginning to use presses comparable with the Wotan.

Another device by which the Soviets are beginning to utilize numbers of unskilled people in airplane fabrication is the German "hole-production" scheme. This is an ingenious system which requires no fixtures or jogs, but permits assembly after the manner in which a toy erector set is put together. A welded steel "master body" serves as a master gauge from which the tools are fashioned to make plane components. Many of these parts are interchangeable, and they can be mated by unskilled or semiskilled workers at a considerable saving of time and assembly space. The Soviets secured this system from the Henschel concern, one of the several German manufacturers to use the "hole-production" technique.

German Aid

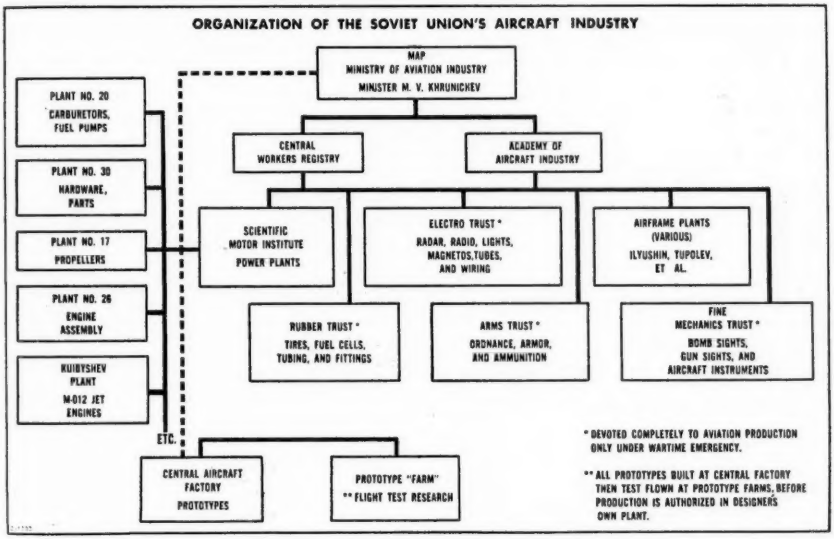
In a number of other ways, German aid is contributing to the improved quality and quantity of Soviet aircraft production. Some of the top industrial organizers are known to have aided in the development and modernization of the Far East and Central Siberian plants. Many of these are underground factories developed along the lines of the German "complex" system. Among the experts known are Anton von Poller, formerly of Hitler's economic staff, Hugo Kreisbahn, Heinrich Kunze, Hugo Sandler, Gerhardt Wilfke, and Gustav Sartorius. These and other experts probably are responsible for the successful marriage which has been consummated between certain of the German combines and the Soviet trusts.

The Russo-German combination benefits the Soviets in a less obvious way. Since the USSR is becoming rather hard pressed to feed itself—as revealed by the fact that almost 50 percent of the civilian labor force is engaged in agriculture, and relatively few hands can be spared from the collective farms—this use of German and other emigrant help permits an in-

dustrial expansion which otherwise might not be possible at this time.

Plant Setup

The factory organization also is unique in many respects. The plant director is an individual of great responsibility. He is a combination of president, chief engineer, labor relations chief, and perhaps


ORGANIZATION OF THE SOVIET UNION'S AIRCRAFT INDUSTRY
MAP
MINISTRY OF AVIATION INDUSTRY
MINISTER M. V. KHRUNICHEV
PLANT NO. 20
CARBURETORS, FUEL PUMPS
PLANT NO. 30
HARDWARE, PARTS
PLANT NO. 17
PROPELLERS
PLANT NO. 26
ENGINE ASSEMBLY
KUIBYSHEV PLANT
M-012 JET ENGINES
ETC.
CENTRAL WORKERS REGISTRY
ACADEMY OF AIRCRAFT INDUSTRY
SCIENTIFIC MOTOR INSTITUTE
POWER PLANTS
ELECTRO TRUST *
RADAR, RADIO, LIGHTS, MAGNETOS, TUBES, AND WIRING
AIRFRAME PLANTS (VARIOUS)
ILYUSHIN, TUPOLEV, ET AL.
RUBBER TRUST *
TIRES, FUEL CELLS, TUBING, AND FITTINGS
ARMS TRUST *
ORDNANCE, ARMOR, AND AMMUNITION
FINE MECHANICS TRUST *
BOMB SIGHTS, GUN SIGHTS, AND AIRCRAFT INSTRUMENTS
CENTRAL AIRCRAFT FACTORY
PROTOTYPES
PROTOTYPE "FARM"
** FLIGHT TEST RESEARCH
* DEVOTED COMPLETELY TO AVIATION PRODUCTION ONLY UNDER WARTIME EMERGENCY.
** ALL PROTOTYPES BUILT AT CENTRAL FACTORY THEN TEST FLOWN AT PROTOTYPE FARMS, BEFORE PRODUCTION IS AUTHORIZED IN DESIGNERS OWN PLANT.

half a dozen other capacities common only to the Soviet system.

The engineers and test pilots each have their representative "guild." These are among the few employees who enjoy even a reasonable amount of personal security. Through their guild, these professionals are responsible only to the director. Neither the Party nor *Smersh* interferes with the pilots and engineering personnel.

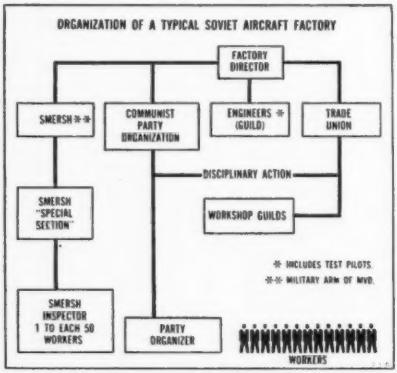
The Trade Union, however, operates through the workshop guilds, of which there are 9 or 10 in the larger plants. The Party organizer and *Smersh* inspectors function at the workers' level. The director is responsible to the Ministry for his production quota. If output lags, he has the Party take "disciplinary action" through the Trade Union. This might be accomplished in the following manner. A few "eager beavers" are shifted around to just the proper spots to show the workers how a real comrade operates. Their exemplary toil usually has the desired effect. But while the Party uses such subtle techniques, the dirty work is carried out by the *Smersh* inspectors. An obvious case of loafing is "sabotage" in their eyes, and the offenders are removed promptly to a slave labor camp.

There are still other reasons why Soviet production is high. Theoretically, the workers in defense industries put in a 10-hour day and work 5½ days a week. But either the organizer or the Trade Union representative can be counted upon to call a meeting an hour or so before quitting time or on the eve of a holiday. Using any number of excuses to make a plea for overtime work, he reminds everyone, for instance, that it is some celebrity's birthday and that, as good comrades, they should make him a present of so-and-so

many extra units. A vote is taken in democratic fashion as the official asks, simply, "Who is against . . .?" The use of such techniques makes the number of "man-hours" insignificant when Soviet production is evaluated by American standards.

Procurement Is Unique

If an aircraft engineer wants to design



a new fighter, he must first have the permission of the Ministry of Aviation Industry. The engineer may, in rare instances, be given the go-ahead with the project, and a definite time in which to complete his work. On the other hand, the Ministry may decide that the engineer's talents can serve a more immediate need such as giving another designer a hand with his project. More frequently, the engineer is given a set of specifications laid down by the Air staff. He must complete his plans by a definite date and submit them to the TsKB, or Central Design Office, for approval. The new airplane is built, not at the engineer's plant, but at one of the several "prototype farms." The plane then is entered in a competition with the prototypes of other designers.

The prototype farms are scattered throughout the Soviet Union, and manned by well-screened personnel. These isolated locations aid in preserving security, and not even other unauthorized Air Force personnel are permitted on these premises. One or two factory test pilots and a small engineering team live with their entry at the farm during its construction, and, subsequently, carry out the tests to make certain that their plane makes the best possible showing. The winning design then is flown by one of the farm test pilots, who writes a critique on the airplane. The report is submitted, via the staff, to the Defense Commissar, Marshal Bulganin.

Orders then are passed, through the Ministry of Aviation Industry, to the agencies responsible for production. Arrangements for power plants are made through the Scientific Motor Institute, and for other components through the various trusts. Production of the fighter may take place in the engineer's plant and any other factories whose facilities are required. The system appears rather devious, by our standards, but it is evidently efficient in the Soviet Union.

Three Zones

Some politico-economic experts hold that the "Red Bear" is rapidly becoming a three-headed industrial monster. The three zones indicated on the map are each in the progress of becoming industrially and militarily self-sufficient, according to this thinking. Each can act, if necessary, independently of the other two, these experts believe. Planes, weapons, and matériel to be used in the Western Zone (East Germany to the Ural Mountains) are being made in the west. Those to be used in Central Asia are being built and stock-piled there. Aircraft and matériel for the Far East Zone (Lake Baikal and the Lena River eastward to the Pacific Ocean) are being built within this area.

This is a setup which is designed ostensibly to permit the USSR to fight a two- or three-front war—offensively or defensively. This interesting probability

suggests an entirely new reasoning behind the postwar industrialization of Siberia and the Far East. It is widely known, for instance, that some of the newest and largest aircraft plants are located in or bordering upon the Maritime Provinces at Khabarovsk, Voroshilov, and Komsomolsk, among other places. The pursuit of this new scheme for self-sufficiency suggests why—in addition to the more obvious reasons—such efforts are being spent in the development of the "second Baku" oil fields in the Volga-Ural plain, the Arctic fields in Siberia, and the oil-rich lands in the eastern Kazakh Province and the Far East.

Manchuria's Role

The extent to which Manchuria figures in this zonal picture also is significant. This is a prize second only to Germany in industrial and strategic value. Manchuria is not a satellite but, rather, a subsidiary. Mao Tse-Tung and the shadowy Liu Shao Ch'i are, so to speak, playing the role of junior partners working the other side of the street for the Cominform. The Communists have a going concern in this area as big as Texas and California combined, with its 43½ million inhabitants, the best rail network in all Asia, and a well-planned (ex-Japanese) heavy industry including aircraft facilities.

Soviet Stock Piles

Should the Soviet Union fight, the stocks of air matériel, other weapons, and strategic materials she has been accumulating ever since 1946 might count almost as much as her production flow. The importance of what she has on hand, compared with what she could produce during wartime, would be governed largely by the duration of any such war and by the supply requirements.

Tanks and Infantry—The Need for Speed

Digested by the MILITARY REVIEW from an article by Lieutenant Colonel R. M. P. Carver in the "Journal of the Royal United Service Institution" (Great Britain) August 1951.

SINCE the end of the war, much attention has been paid to ensuring that the pre-eminent position of the infantry is maintained in peacetime, to maintaining a higher standard of infantry training, and to integrating all arms in support of the foot soldier. This is all healthy and good; the Royal Armoured Corps, more than any other arm, should welcome every effort which may lead to an improvement in the standard of training of the infantry. However, some of us have a fear, shared by many infantrymen, that infantry training today tends to concentrate too much on the operations which were found comparatively easy during the last war and not enough on those operations which were the most difficult, which demanded the highest standard of infantry training, and which paid the greatest dividend for the least expenditure of human lives.

Characteristics of Infantry Units

Tank soldiers, most of all those who served in independent armored brigades which supported several different divisions, infantry and armored, realize, perhaps better than many infantrymen, the widely varying standards and characteristics of different infantry formations and units.

If I had been asked at the end of the war, or were asked now, in what particular I found the greatest difference between the various types of infantry, I would have said that it was in the speed at which they could organize and execute an operation and in the initiative shown by the junior commanders. The standard in airborne and motorized infantry units generally was higher in these respects than in the regular infantry divisions. The standard within infantry divisions varied immensely, from those which equalled or surpassed mobile or airborne formations to those which were agonizingly slow. If, again, I were asked what was the greatest need of the infantry today, I would say that it was to bring all British infantry up to the standard reached by the best in these characteristics. The standard was not only reached at the end of the war; it probably was at its highest in the Eighth Army at the end of the North African campaign. There were many occasions in Northwest Europe when I could not help wondering what fate some of the more stately formations would suffer if they had to consider a serious counterattack by the enemy, or try and compete with the type of operations we had to undertake in the desert before Alamein.

Functioning of Command

The Germans and the Americans both rightly accuse us of being ponderous in action. It is wrong to assume that this is a national trait. When trained for mobile and rapid warfare, the Briton is second to none. The main reason is that we have not sloughed off the effects of World War I. The difference in outlook and method between those who started the war in the desert, where failure to act quickly led inevitably to capture or worse, and those who had trained for many years in England, was most noticeable when we got to Tunisia, Italy, and Normandy. The tendency of training in peacetime, or in England in wartime, to hold extensive post-mortems after exercises, to stress the importance of careful planning and detailed foresight, and to see that everyone is in the picture, important as these factors are, led, and still leads, to the lengthy and detailed con-

ferences and the meticulous planning which is so often criticized by Americans and causes so ponderous a functioning of the military machine. Contrast it with Rommel's method of command and note the results. This criticism is not confined to the infantry; many armored formations, particularly army tank brigades, were equally ponderous.

Mobile Warfare

First among the causes of slowness on the battlefield, therefore, is the ponderous functioning of command, a legacy of World War I. Second is our general concept of land warfare, also a legacy of that war, unfortunately reinforced by a good deal of experience in the last war in such theaters as Italy and the Far East, and aggravated by the type of operations in which the Army has engaged, since the end of the war, in Palestine, Malaya, and Korea. In discussing this, it is as difficult to maintain a central, reasonable, and realistic attitude, without being misunderstood, as it is in politics. One is accused by the extreme advocates of mobility of giving in to the mentality of World War I, and by the average infantryman of trying to resurrect a discarded theory that wars can be won by mobility alone without the infantry.

The basic principle, which was as true thousands of years ago as it is today, is that the pitched battle is not decisive unless it leads to the conditions in which mobile forces can be employed. Unfortunately, history and the popular conception of war on land throw the limelight on the pitched battle, and only students of war, as a rule, study and remember the moves which precede and follow. But it is those moves which force the decision. That, surely, is the main lesson to be learned from the experience of 1914-18—and from the *Iliad*.

Attrition is a wasteful, indecisive, and despairing method of warfare, in which victory, if it comes at all and is worth having when achieved, goes to those with the greatest reserves of manpower. To take only one example, the battle of Alamein was not of itself decisive until it led to the conditions in which we could employ our mobile forces. It was the pursuit after Alamein which decided the campaign in Africa. If this principle is kept firmly in mind, and the well-planned battle is seen as the means of creating as rapidly and cheaply as possible the conditions of mobile warfare, one gets one's values in proper perspective, and the importance of training, organizing, and equipping one's army for mobile warfare becomes evident.

Training

Let us take training first. There is a tendency to divide operations up into those executed by infantry divisions and those carried out by armored divisions, and to imagine that there is a clear-cut division between the two. In the first case, that is, operations executed by infantry divisions, the actions involve a well-planned battle, where all details have been worked out in advance, and the sudden, hand-to-hand type of fighting, carried out at infantry pace with infantry as the primary fighting arm, supported by tanks on the basis of an armored regiment to an infantry brigade. In the second case, that is, operations carried out by armored divisions, the actions involve the pursuit, with tanks as the primary fighting arm, supported by infantry. The fact that there may be a mobile battle or a period of mobile warfare, which is neither pursuit nor withdrawal, often is forgotten. There were many such battles on the Russian front during the war, and the campaign in France in 1940 was another example of this type of combat. Perhaps the best example in our own experience was the prolonged battle around Tobruk, in 1942, often called the battle of Gazala.

The result of this is that training tends to concentrate on the well-planned battle

(with all the details worked out in advance) for the infantry division and the pursuit for the armored division. Although the former involves very intricate and detailed staff work and the most intimate integration of all arms, both are fundamentally simple and comparatively easy, as they are not possible without a considerable degree of superiority over the enemy. The real test of quality in leadership and training comes in all the various types of operations between the two, which will be the decisive stage. It is these stages which seem to be neglected in training, principally because they are extremely difficult to practice with any realism. Neglect of training for this type of action, however, may prove disastrous.

Organization

This attitude also has a serious effect on organization, particularly in the armored division. Success in these operations depends largely on speed, for it is only by superior speed that the initiative can be seized and maintained. It must be the constant aim of all concerned to develop operations as rapidly as possible beyond the speed of the man on his feet, and to prevent them from returning to that tempo. This is true not only because a man on his feet moves so slowly, but also because the speed of control is inevitably so slow in dismounted operations. Speed on the battlefield is not solely, nor even primarily, dependent on the actual miles an hour which tanks or other vehicles can achieve. It depends most of all on speed in acquiring and disseminating information, making decisions, issuing and transmitting orders, and, most important of all, in translating them into action.

Reorganization Wastes Time

One of the principal, if not the chief, causes of delay is that of reorganization within units and formations in order to execute orders received. The process of "marrying-up" different arms to suit the requirements of the task, particularly if they are not accustomed to fighting together, can be very lengthy, involving not only tactical grouping, but also signal and administrative arrangements. Failure to "marry-up" properly will lead to failure in the execution of the task. It is, therefore, of vital importance that the normal organization of a formation should suit as wide a variety of tasks as possible, and it is here that the proper balance of armor and infantry becomes extremely important.

In the well-planned battle, particularly if mine fields have to be cleared, the infantry generally is the primary fighting arm and a proportion of one squadron of tanks to one battalion, considering the area of ground covered, is normally both suitable and sufficient. At the other extreme, in the pursuit, if the country is open and if opposition is light or completely disorganized, it may be possible to operate an armored brigade with the support of only one motorized infantry battalion. Under these conditions, a greater proportion of infantry will only tend to slow down the tempo of operations. In any but open country, or where there is practically no opposition, as we discovered in Northwest Europe, a higher proportion of infantry to tanks probably will be needed, particularly now that we have to face the menace of the bazooka-type weapon.

Standard Formations Were Effective

The experience of Northwest Europe led almost all armored formations to adopt a standard brigade formation of two armored regiments and two infantry battalions, the latter motorized or regular infantry battalions, carried wholly or partly in armored personnel carriers or on the tanks. This had been the standard formation of the German panzer division for a long time. The brigade was formed into two groups, each consisting of an

armored regiment and an infantry battalion, and, within the group, squadrons and companies were "married-up" into squadron-company groups. Almost all, armor and infantry alike, who experienced this formation came to appreciate how effective it was for a wide variety of operations. I personally employed it with great success in conditions as different as the hand-to-hand fighting and the "break-out" in Normandy; the second stage of the clearance of the area between the Maas and the Rhine in February 1945, a well-planned battle under the most difficult conditions of ground and weather; the "break-out" from the Rhine bridgehead; and subsequent operations up to the Baltic. That this combination of mobility, fire power, and ease of control, with the decisive characteristics of infantry, could be employed in such a variety of conditions without any reorganization was a decisive factor in speeding up operations and in raising the standard of co-operation between armor and infantry to a very high degree. The only time it was not suitable was during prolonged defensive operations, or where major obstacles, such as defended mine fields, rivers, or ground impassable to tanks, prevented the full employment of tanks. Although these conditions occurred fairly often, they were of short duration.

The Formation of the Future

It seems to me, therefore, that success in the decisive stages of land warfare depends on our ability to employ this type of formation effectively. We shall not be able to do so unless we train for it and are organized on that basis. It needs a high degree of training, particularly in the infantry, and demands far greater speed of thought and action and a higher degree of initiative on the part of company and platoon commanders than normally is achieved as a result of training for the well-planned battle. It demands from both armor and infantry a high standard of radio discipline and battle drill.

Change in Outlook Needed

It is, perhaps, most unfortunate that, at present, the armored division is organized with the tanks all in one brigade, and almost all the infantry in the other. On rare occasions (very rare in Europe), the armored brigade might fight as a whole, but the infantry brigade never without at least one regiment of tanks. For the vast majority of operations, I am sure that the division should be organized as two identical brigades, each of two armored regiment-infantry battalion groups. If that is how they will fight, that is how they normally should be organized. I am not impressed by the argument that an "armored" brigadier must train and normally command and administer the armor, and an "infantry" brigadier the infantry. It is only by training and commanding the other arms that the commander who has to lead them in battle will learn to understand them fully. The present system only tends to perpetuate the undesirable reluctance of armor and infantry to serve under each other's commanders, a reluctance which, as a result of the present system, is unfortunately only too often well founded.

However, it is not only in armored divisions that a change in outlook is needed, but also in infantry divisions and independent armored brigades. There is a tendency to think that the only way to employ an independent armored brigade in an infantry division is to allot one armored regiment to each infantry brigade and leave it at that. In the initial stages of a well-planned attack, that normally will be the right answer; but I am sure that it should be the aim of every infantry division commander to employ his armored brigade as a brigade, by the addition of an infantry battalion, carried in armored personnel carriers if possible. In

addition, as the situation warrants, other combinations are possible. Unless these are known, there always is the danger that the well-planned attack will never get beyond the hand-to-hand combat stage.

Conclusion

The process of passing an armored division through an infantry division to achieve the "break-out" is a complicated and often a slow business, which is apt to lead to a loss of momentum and initiative. The infantry division must start the "break-out" itself with its own armor and must be prepared to fight a mobile battle thereafter. Success in these vital operations depends on rapid decision and action, on the ability to create, seize, and exploit opportunities with the least delay. This will be possible only if all arms, particularly armor and infantry, are trained, organized, and equipped to this end. With the number of formations and units in the Army being increased, now is the time to concentrate on this type of training.

Courage and skill are priceless ingredients in the compounding of a victory. In this modern age, we must put in the hands of those whom we would call upon to fight the best and the most modern weapons that we can contrive, in sufficient quantities in order to force a favorable decision swiftly as well as decisively.

Secretary of the Navy Dan A. Kimball

We must carefully evaluate the enemy we expect to face and, upon the basis of the best information we can obtain, we must plan our course of action and determine the character and amount of weapons we need. Such a plan once made must be adhered to unless a significant change in the international situation occurs which makes alterations of plans wise.

Admiral William M. Fechteler

Interallied Military Co-operation

Translated and digested by the MILITARY REVIEW from an article by Lieutenant Colonel Guttemberg A. Miranda in the "Defesa Nacional" (Brazil) February 1951.

THE problems of military co-operation among allies, in wartime, can assume varying aspects, depending on the type and amount of co-operation; on the political, economic, and military structures of the allies; and on the area—distance and position—where such co-operation will take place.

During the last war, interallied co-operation was developed to a high degree, but it seems that the experiences of such co-operation were not put to use, because, as far as we know, no systematic study was made to develop a better understanding of the subject.

The various aspects of military co-operation to which we will refer in this article are those which resemble the ones encountered in the participation of the Brazilian Expeditionary Force in the Italian Theater of Operations during the last war. In brief, this article will concern itself with that co-operation necessary, in wartime, when a nation sends an expeditionary force overseas to assist an ally.

It is obvious that there can be other types of military co-operation or that the problems can be viewed in a different light; however, the following subtitles refer to this one form of military co-operation.

Political Objective

The government of the co-operating nation, once it decides on providing an expeditionary force, should determine, based on its *political objective*, two essential elements of such co-operation: *timing* and *strength*.

These two elements must be specified, in definite terms, or they will cause great loss to the co-operating nation, as well as to her allies.

In short, the purpose and material aspects of this form of military co-operation are based on the *political objective*, and they should conform to it.

Scope and Strength

In organizing an expeditionary force, it must not be forgotten that it should be composed of integrated combat and service units. Such an organization provides service support units of the same language and nationality, and assists in strengthening the morale of the combined force. Naturally, such service personnel and units should be integrated into comparable echelons of the whole allied force in order to achieve maximum effort, and to provide operational experience for the personnel and units of the co-operating nation.

As regards strength, adequate provision should be made for the establishment of a replacement depot in the theater in order to ensure replacements for the expeditionary force. Such replacements should be in sufficient numbers and grades, so that they can be used to fill any vacancies that may occur in the staffs or units.

In addition, the number of replacements should be maintained at an adequate level to provide sufficient replacements for a predetermined time, even when the flow of replacements from the Zone of Interior is interrupted.

Military Planning

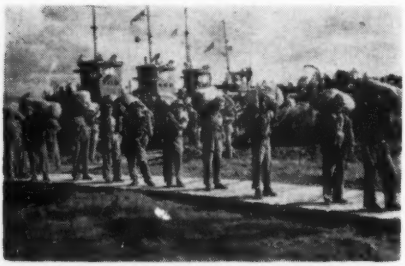
Once the military co-operation has been decided upon, and its scope and strength established, the preparation of a plan of action becomes urgent. This plan should include, among other things, the features specified in this article, and, of course, the military organization of the units and

other components of the expeditionary force.

We would like to refer specifically to two basic military features of such an organization, namely:

1. The size, types, and number of units.
2. Problems relative to the selection of personnel for the expeditionary force.

These are such large problems that they



Brazilian troops debarking from LCIs at Leghorn, Italy, during World War II.

are seldom solved completely or satisfactorily.

Psychological Preparation

The psychological preparation of a country for this type of co-operation is based, essentially, on a "public relations basis" directed to the orientation of public opinion. If there is no organization already in existence which can handle this task, it is difficult to obtain a satisfactory psychological preparation. Occasionally, public opinion, without any guidance, can reach such a pitch that it can surmount all obstacles. However, it also can follow an opposite course of action.

This lack of preparation may represent an obstacle which is impossible to overcome in the realization of the plan, or it can bring, later, an unexpected change in the government's position relative to the sending of an expeditionary force.

The morale preparation of the expeditionary force is a consequence of this psychological conditioning, and, from its inception, it depends on the outcome of the various aspects covered in this article, many of which are closely related.

Military Direction

The different sections which compose a military organization have their own normal duties and, as a result, are not well equipped to handle the many urgent tasks related to military co-operation. Therefore, it seems advisable to create an agency, within the military establishment, solely for this purpose. It should possess authority, flexibility of action, and be responsible directly to the Secretary of Defense. For this reason, its head should be a choice of the latter.

Replacements

We have mentioned before the necessity for establishing a replacement depot in the theater of operations to handle the flow of replacements to the front.

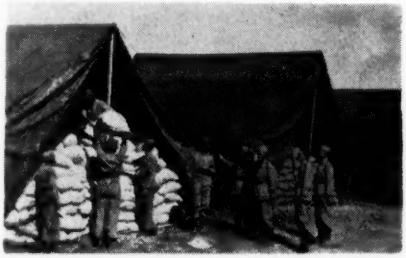
The major effort of the replacement depot should be directed at maintaining

Brazilian medical personnel working with the Americans in an army field hospital.

adequate reserves of all types of replacements, and not at just maintaining a large number of replacements. Such personnel should be allocated in proportion to the estimated losses among the different grades, branches of service, and specialties.

The depot, if it does not provide the required troops, may bring about the weakening of the force to such an extent

that it might mean its removal from the front line. This may occur even if the depot has maintained sufficient replacements, but has neglected maintaining sufficient replacements for specific assignments. Therefore, it is essential that there exist a flow of replacements, based on actual requirements, from the Zone of Interior to the oversea theater.



Brazilian troops picking up supplies from a quartermaster depot somewhere in Italy.

In short, the co-operating nation must not only assume the responsibility of providing an expeditionary force, but must maintain it in fighting condition until the end of hostilities.

Without taking into consideration, as a natural occurrence of war, the possibility of a defeat of the entire force, but reckoning only with the normal losses of a campaign, as happened during the last war, it is natural that one should be prepared, at the worst, to replace the entire force every 6 months. To plan differently is to expect the troops to fight for a short period, and then be replaced in the lines while they are built up to fighting strength again. Reality does not always agree with such planning, for the situation may demand that the troops be kept in combat operations for long periods of time.

Command of the Expeditionary Force

It is essential to organize a high command, independent from the command of the combat force itself, even though this force may be small and even if it is not supported by other elements of the same nationality. For example, an expeditionary force of division strength would have an expeditionary force commander and a division commander. Thus, the high command would be able to take care of all problems on the higher echelons of command (allied staffs), and the division or combat force commander would be able to concentrate most of his efforts on the tactical aspects of the operation.

Military Equipment

The standardization of military equipment for the co-operating forces is essential, for it provides:

1. Uniformity of action, and assists in maintaining liaison among the forces.
2. Greater flexibility in replacing other allied units in combat.
3. Adequate supplies of matériel to replace combat losses, particularly when the expeditionary force would be unable to take care of such losses from its own reserves of matériel in the theater.

A Brazilian Expeditionary Force front-line communications post in Italy in 1945.

The problems inherent in the use of nonstandard equipment are great, and, even when the military co-operation is effective among the great powers, the problems sometimes are impossible to solve.

The nation providing the expeditionary force should not be forced to equip it with the matériel already being used by the

forces-in-being. Rather, it should receive its equipment from the nation with which it is co-operating. This is particularly true when the nation providing the expeditionary force does not have the facilities for the manufacture of such matériel.

BEF mortarmen of the Sampaio Regiment supporting infantrymen making an attack.

From the above, we can single out two important factors:

1. All military equipment should be supplied by the nation with whom we shall co-operate.

2. When the nation providing the expeditionary force does not have its forces equipped with the same type of matériel that will be used by the other allied forces, adequate time must be provided so that the expeditionary force can be trained properly in the use of such matériel.

Up-To-Date Instruction

Before its commitment, the units of the expeditionary force should be brought up-to-date with regard to the weapons, tactics, and procedures used by the allied forces.

If such instruction will not require too much time, it may be accomplished in the theater of operations. If the expeditionary force will require a great amount of instruction, it should be accomplished in the Zone of Interior.

The presence of a partially trained expeditionary force in a theater of operation may cause serious embarrassment both to the force itself and to the nation accepting the co-operation. In addition, there is always the danger that the force may be sent into action, in the event of a critical situation, before it is prepared for combat.

Language Liaison

Differences in language make many of the tasks of preparation and military co-operation difficult, and, naturally, result in many misunderstandings which are detrimental to the good relations among nations.

The nation receiving military co-operation will have to appoint personnel qualified in the particular language to assist with the liaison and instruction of the expeditionary force. In addition, the nation providing the co-operation should place its personnel, who are qualified in other languages, on the various staffs of the allied nations, and not restrict their use solely to liaison duties.

Liaison With the Theater Command

The co-operating nation should have an accredited staff to work directly with the allied high command on any question of co-operation.

A Brazilian Expeditionary Force patrol starting out on a reconnaissance mission.

It is not enough to have operational or tactical liaison at the front and within the echelons of expeditionary force. Over and above these problems of liaison and the agreements among allied governments,

many problems will arise which should be solved by the high command of the allied forces within the theater.

Mutual Understanding

Mutual understanding, as used in this article, refers to agreement among the allied forces in the theater. This will de-

Motorized BEF troops pursuing retreating German forces north of Montese, Italy.

pend, primarily, on the success of the liaison among the forces, and on a complete understanding of the problems that must be solved by the various staffs.

The exceptional relationship which existed during our last interallied co-operation proves the advisability of achieving mutual understanding among the allied forces.

A public relations program directed toward better understanding and cordiality should be instigated among the planners of the allied forces. Through this program or by means of other sources of information, it is essential that the various commanders are informed of any difficulties or deficiencies in mutual understanding among the allied forces so that they may be corrected in the shortest possible time.

Conditions of Employment

From the strictly military point of view, the policies which govern the employment of an expeditionary force in a theater of operations are related closely to its organization and training, as well as the degree to which it has been able to adapt itself to conditions within the theater.

These policies are normal and well known by all, being part of our manuals. However, they are not always observed.

When the great powers commit their forces to combat, counting upon sufficient reinforcements on hand to replace any losses incurred, only an exceedingly large casualty rate will have any influence on the conduct of their operations.

However, in the case of a nation which possesses only one contingent in the theater, its premature or rapid dissipation can lead to a critical situation.

Experience shows that allied tactical commanders, up to the corps level, do not give adequate consideration to this problem. They think of military forces only as units to be employed in battle and, therefore, commit them to action under the same conditions that they would commit their own forces.

On the other hand, the higher commanders are able to understand such dif-

BEF troops awaiting the signal to move forward in the Castel D'Aiano area, Italy.

ferences in the employment of co-operating forces, and can better estimate the area where they can be employed without running the risk of their complete loss.

The responsibility for such a decision generally does not rest with the respective governments, and it is far above the front-line commanders. It should remain

completely with the commanders in chief of both the expeditionary force and the allied forces in the theater of operations.

Rations

The nation receiving the co-operation must assume the responsibility for feeding the troops of the expeditionary force. In addition, the rations provided the expeditionary force should be the same kind or type of rations that the troops are accustomed to eating, depending upon the peculiar customs or tastes of the nation.

Postal Service

Although it is a well-known fact that the postal service has a major bearing on the morale of the troops, there are few examples of such services operating efficiently.

Factors contributing to such a situation include: inefficiency in the organizations handling the mails, generally attributed to unqualified personnel within such organizations; insufficient means of transportation and communications; and a lack of understanding among the various postal services of the allied nations.

Press and Public Relations Problems

The psychological preparation of the nation and the military forces cannot be accomplished without the assistance of the press and the public relations agencies. However, most of the problems relative to press and public relations matters can be attributed to a lack of understanding between those agencies and the military.

Evacuation Problems

Evacuation can present the following problems:

1. The need for maintaining qualified interpreters with the medical services.
2. The care and routing of casualties being evacuated from the theater of operations. This might involve transferring casualties to other allied nations prior to returning them to their own country.
3. The collection, storage, and shipment of personal belongings, pay, and mail.
4. The notification of next of kin.

The United States and the other nations of the free world are building a mighty military force for common defense against the Soviet threat to peace and security. We are expanding our Army, Navy, Marine Corps, and Air Force at home, and using our greater strength to help our allies build their armed forces around the world.

Major General George H. Olmsted

Naval Aspects of the Mission to Turkey

Digested by the MILITARY REVIEW from an article by
Commander Harold G. Bowen, Jr., in the "United States Naval Institute Proceedings" October 1951.

THE current program of military aid to Turkey has passed its fourth birthday, and it seems appropriate to examine some of the naval aspects of the program with a view to understanding what was to be done, what has been done, why it has been done, and what may be the results of the program in its relations to Turkey and the world. In order to develop a clear picture in these matters, it will be of considerable help to inquire into some of the pertinent background of the Turkish nation and the traditions of its Navy.

Rise of Nationalism

Modern Turkey was internationally "recognized" with the adoption of the Treaty of Lausanne in 1923, and at that time Turkey took a respected place in the family of nations. Under the leadership of Kemal Ataturk, some of the most revolutionary reforms ever to be peacefully instituted in any country of the world were launched at that time. The very basis of Turkish life was swept away with the secularization of the codes of law and education. This amounted to an extensive uprooting of many things that the average Turk had believed to be sacred. The Moslem faith continued to be practiced, but its former all-pervading influence was strictly circumscribed. Swiss civil, Italian banking and penal, and German commercial codes were adopted. The French Constitution was taken as a pattern, and the form of government is quite similar to that of the French, although it has not as yet achieved the extreme multiplicity of political parties that is the case in France. The Arabic script, which has been a severe deterrent to literacy, was replaced by a Latinized phonetic alphabet, and the Western calendar was adopted. Wearing of the traditional fez was forbidden, and the requirement that women wear a veil was revoked. Oriental influences were removed or discouraged, and emphasis was placed on the development of a new and modern Turkey of nationalist Turks. In an effort to achieve an association with this nationalist feeling, the capital was removed from Istanbul to Ankara, in the heart of Turkish Anatolia, thus breaking completely with the scene of the many intrigues that continually beset the failing Ottoman Empire.

An Instrument of Turkish Power

The extension of naval aid to Turkey has a good deal more of a logical basis than may appear, at first glance, to one who is not familiar with the long and honorable history of the Turkish Navy. When it is recalled that for almost a century and a half the Turkish Navy was the dominant instrument of Turkish power in the Mediterranean, it can be argued that the immediate post-World War II status of this Navy imparted an element of instability to the political situation in that area. Indeed, the services of the Turkish Navy under its great admirals, Kemal Reis, Barbarossa, Dragut, Uluch Ali, and Muzinade Ali, contributed largely to the expansion of the Ottoman Empire, and made the Mediterranean a Turkish lake during the period of its ascendancy. This, of course, was likewise true of the Black Sea. The decline of the Ottoman Empire commenced with the decisive defeat of its fleet at Lepanto, in 1571, by the combined forces of the Christian League under Don Juan of Austria. The Turkish naval prestige never recovered from this crushing defeat and its progressive decline was mirrored in the political deterioration of the Ottoman

Sultans. This glorious naval past, however, has not been forgotten and represents a tradition that is ever in the minds of the Turkish Navy of today. Just as our Navy draws tangible inspiration from the exploits of John Paul Jones and other naval greats of the past, so do the Turks venerate the brilliant achievements of Barbarossa and others of earlier days.

Strategic Position

Turkey's position as a sea power is not hard to understand. Besides being astride those ever strategic straits, the Bosporus and the Dardanelles, Turkey is washed by seas on three sides and bounded by rugged and mountainous terrain on the fourth, thereby taking on many of the aspects of an island. Such a geographical position would require an effective naval force in the interest of national security. Additionally, in this volatile region of the world, it can support Turkish strength that must exist to afford political stability to the area. Hence, the decision to assist the Turks in regaining at least some of the elements of sea power was a logical course for the United States to pursue. It was a course that was of mutual benefit to the United States and Turkey, and its functioning was favored by this circumstance.

The Truman Doctrine

Aid to Turkey, instituted under Public Law 375 of the 80th Congress, or what has come to be called the Truman Doctrine, got off to a noisy start with the huge publicity accorded that Doctrine as the first positive move to contain the advance of communism in Europe. In its implication to the Kremlin, it can be likened to a Soviet decision to supply arms and military advice to a Communist government of Mexico. To Turkey, it was the first practical sign that the United States stood ready to give active aid to her in resisting the mounting Soviet pressure. The initial implementation by this country took the form of a Survey Mission. The Survey Mission arrived in Turkey in May 1947, and spent approximately 2 months viewing the then existing conditions in order to provide a sound basis for a report and recommendations. Upon the return of the Mission, immediate steps were taken to form the several service components that would proceed to Turkey as the Mission to do the job. This Mission, originally called the American Mission for Aid to Turkey (AMAT), thereupon commenced the ordering of matériel and the dispatching of personnel to Turkey.

The purpose of military aid to Turkey was, and is, not the creation of a vast military machine there that could not be supported by the Turkish national economy. Rather, it was hoped, by modernization and improvement of the existing armed forces, to effect a smaller numerical, but more efficient and effective establishment, thereby affording more protection for less military funds in the Turkish budget. This would act to decrease the economic drain of supporting a large military establishment required by Soviet tactics and the world situation, and, in addition, make more manpower available to the Nation's civilian economy. Consequently, the replacement of obsolescent equipment and the institution of modern techniques in the employment of the armed forces were primary goals and should be borne in the reader's mind in the subsequent development of this article.

Organization of AMAT

AMAT was composed of four major groups initially—Army, Navy, Air Force, and Public Roads Administration. The American Ambassador to Turkey was designated Chief of AMAT, thereby effecting greater administrative cohesion than had originally existed in Greece where the American Ambassador and the Chief of the Aid Mission had been different indi-

viduals. The Chief of the Army Group was further delegated authority as the co-ordinator of the military groups to increase the co-ordination and efficiency of the military aid. The initial appropriation for Turkey was 100 million dollars divided as follows: 48½ million dollars for the Army; 14½ million dollars for the Navy; 27 million dollars for the Air Force; 5 million dollars for arsenal improvement; and 5 million dollars for the Public Roads Administration for highway development. In the second fiscal year of the program, 1948-49, out of an appropriation of 75 million dollars, the naval share was about 12.3 percent. Subsequent monies allotted to the Naval Group have been of about the same percentage of the total Mission appropriation. These proportions have, of course, reflected the relative size of, and costs of material for, the several Turkish armed forces. In the early days of the program, the amount of material furnished is not truly indicated by the monies allocated because of the large amount of surplus that was available for transfer to Turkey at a small fraction of its initial value. With the gradual diminution of these surplus stocks, and the increase in our own needs, there was a considerable reduction in equipment supplied for each dollar spent.

Co-operation the Keynote

The headquarters of the AMAT was established and maintained in Ankara, the seat of the Turkish General Staff, with whom a close liaison was effected. Opposite numbers were in intimate and day-by-day contact, and a particularly high order of co-operation was achieved. Field activities were established integral with comparable Turkish activities. The Naval Group, with initially five officers and five enlisted men in Ankara, maintained the remaining 75 percent of its personnel in the Istanbul-Sea of Marmara area, pursuing training activities, equipment installations, and school functions. This latter area contained the bulk of the Turkish Navy's vessels, repair facilities, and schools. Frequent travel was, of course, required by the personnel of the field activities and the staff in Ankara.

Modernization Was Needed

The Turkish Navy, in the summer of 1947, was essentially of World War I vintage in point of view of equipment. Turkey had not had the influence of combat participation in World War II to accelerate its thinking, and its equipment was deficient in the light of requirements developed in the navies of those countries who had fought the war at sea. The tremendous impact of electronics had scarcely reached the Navy in the Sea of Mamara. Techniques and equipment which we took for granted were new fields of thought to them. This fact greatly conditioned the receptivity of the Turkish Navy (and their other services, also) to the American program and has a considerable bearing on the speed with which it has been effected. There was never any doubt about the valor of the Turk, his aptitude for learning, or his conscientious desire to learn the best for his country. He was working with a heritage that had hardly prepared him for the rapid pace of technical events that was about to confront him.

Equipment

The Turkish Navy was composed of a great many "hand-me-downs" from other powers. The largest vessel and the flagship of the fleet was, and still is, the *Yavuz*, which had been the German *Goeben* at the beginning of World War I. Two cruisers, the *Hamidiye* and the *Mecidiye*, had been retired to the status of training and barracks vessels. In the next smaller category were destroyers, of which four were the *Kocatepe*, the *Adatepe*, the *Tinaztepe*, and the *Zafer*, built in Italy in 1938 and were not, in 1947, first-line ships.

The four other destroyers were among the more useful vessels of the fleet. These were all of British construction, the most modern of which, the *Gayret*, was in the Royal Navy in World War II before its delivery to Turkey. The *Sultanhisar*, the *Demirhisar*, and the *Muavanet*, the remaining ex-British destroyers, were all of slightly older vintage. Minesweeping craft were, in general, the most modern type at hand. There were eight of Australian origin and eight received from Great Britain after the war which had been built in the United States as BAMs (minesweepers for lend-lease). Significant of Turkish problems in these matters, the ex-BAMs were delivered without their associated Asdic equipment. Submarines, of which there were 10, hailed from Holland, Germany, Spain, and Great Britain. The three newest, from Great Britain, and perhaps the two German boats, were the only ones considered ready for action. In addition, there was a variety of small auxiliaries and small craft, none of which was particularly modern. The over-all condition of these vessels of the Turkish Navy was fair to good.

Establishments

The shore establishment centered largely in the Sea of Marmara, with the main fleet repair base located at Golcuk, near the eastern end of the Gulf of Izmit. In this vicinity was a complex of shore activities, including a mine depot, minesweeping repair base, net and boom depot, torpedo repair and storage base, and ammunition depots. In Istanbul there was a supporting repair base, used mainly for minesweeper overhaul and destroyer docking. Mine and net depots were situated at appropriate locations outside of this Marmara area. Outside of numerous naval radio stations scattered throughout Turkey, this comprised the major portion of the material shore establishment. The Turkish Naval Academy was located on the island of Heybeli Ada, near Istanbul, and the Naval Staff College was located in Istanbul.

Personnel

The Turkish Navy had on active duty about 14,000 men, of whom in the neighborhood of 1,400 were officers. The direction of this force was exercised from two sources: The Naval Chief of Staff, serving under the Chief of the General Staff; and the Under Secretary of the Navy (a rear admiral), serving under the Minister of National Defense. The latter controlled the money while the former was the planner and the director of operations. This was an anomalous situation that was further complicated by the position of the Turkish Commander in Chief of the Fleet, who was senior to both of the admirals in Ankara and, with his headquarters at Golcuk and afloat, physically at a considerable distance from them. There were some 10 other admirals stationed generally in command of shore facilities and in the high echelons of the fleet. These officers always made a courteous and conscientious effort to co-operate with the aims of their American advisers.

Turkish naval officers generally represent a very high type of Turk. All officers are graduated from the Naval Academy at Heybeli Ada and become either deck, engineering, or supply officers. Those who are fortunate enough and highly capable may later attend a staff college and receive a special addition to their uniform insignia and the equivalent of 4 years' seniority over their less fortunate colleagues. The officers are intelligent and very earnest in the performance of their duties. Their only handicaps stem from lack of experience in modern techniques and methods.

The enlisted men are the ones with relatively the least abilities. While the rated men are, in general, career men, they are not allowed to develop with the same in-

crease in authority as are our petty officers. The nonrated men are conscripts, serving 3-year periods, and of a low average order of education. They were not developed to anywhere near their potential, and hence did not represent the great source of reserve strength that they might. This situation is improving rapidly and conscripts who display ability may now become petty officers. Discipline is of an extremely high order in the Turkish Navy and the courage and earnestness of the Turkish bluejacket can never be doubted.

In 1947, the Turkish Navy was at a state of training that did not compare favorably with the navies of the allied powers. This is, of course, quite understandable when viewed in the light of Turkish abstinence from combat participation in World War II and the realization that their competency of training may have been excellent but was out of date. Great Britain, under whose aegis the Turkish Navy had passed after World War I, had a small number of Royal Navy officers there under contract to advise on the installation and operation of British equipment. There were, in addition, some British officers on the staff of the Naval Academy. The British Group, although they contained one radar officer, had not had the opportunity to do more in this field than to reveal the intricacies of electronics to a few Turkish officers—and to no enlisted men. One officer in the entire Navy had had a course in this subject in a school in the United States. So it might be safely stated that a very small appreciation of electronic equipment had been experienced.

Considering the equipment that they did have, and the opportunities that had been presented to avail themselves of new techniques, the Turkish Navy was a seamanlike, well-disciplined, and well-trained organization. But, unfortunately, it was trained for another era—one that preceded the age of the airplane and the vacuum tube. This was essentially the problem of the Naval Group—to bring it of age. It needed modern equipment, instruction and supervision in the installation of that equipment, training in the use of that equipment and in the modern techniques of naval warfare, and a maximum of co-operation and understanding between the two navies. This was what the Naval Group set out to accomplish.

The program of the Naval Group was conceived by the naval members of the Survey Mission based on their judgment of the naval requirements demonstrated to them during their 2 months in Turkey. The Naval Group took this program, contained in a report by the Survey Mission to the State Department, as the basis for its program, modifying it as necessary and evidently required during the implementation. Obviously, with the passage of time on the job, this became increasingly more manifest. The first phase was concerned with ordering the material and reconciling differences that develop from the conflicts arising out of availabilities at this end and suitability at the receiving end. As the work progressed, the Naval Group moved in increments to its headquarters in Ankara and established effective liaison with the Turkish General Staff and an increasing co-ordination with the other military groups. The organization was constantly adapted to the changing phases of the requirements to keep in tune with the actual developments.

Vessel Transfers

The vessel transfers were effected in essentially the same numbers and categories as those recommended by the Survey Mission, with the major exception of the four submarines instead of PT boats and small tugs. Those transferred in the initial group were four submarines of the Brill Class, eight high-speed minesweepers, one motor torpedo boat tender, one

gasoline tanker, and one net laying ship. Four destroyers of the Buchanan Class were transferred in 1949, and two additional submarines and an ASR (auxiliary submarine rescue) have recently been added to the Turkish Navy from the same source. The submarines and destroyers are replacing the obsolete Italian-built destroyers of the Zafer Class and the over-age and useless submarines of Spanish, Dutch, and German parentage. The other vessels are of the service variety to give a reasonable balance to the resulting force. Since vessels are ineffective and short-lived unless properly maintained, the program of capital equipment was designed to give adequate support to the force. This entailed the supply of material to put the fleet repair base at Golcuk in first-class condition. Here, the problem was to rehabilitate a naval base that had received various unavailing development programs from Dutch and French sources over a period of many years preceding the arrival of the United States Naval Group—all at the expense of the Turkish Government. In addition to the base at Golcuk, equipment was ordered for the smaller repair base at Taskizak (Istanbul), the several mine, net, torpedo, and ammunition depots, and the minesweeping base and degaussing station. The ordering and acquisition of this material consumed the greater part of the efforts of the Naval Group for some time and was effected by the display of a high order of co-operation between Turks and Americans and adherence to the belief that the primary purpose of the naval material shore establishment was to maintain the fleet in an efficient operating condition. The latter has eliminated the diffusion of effort that might well have attended any excursions into the shipbuilding field. All capital equipment was ordered with this thought in mind. The day when the Turkish Navy can economically build vessels larger than small craft in its yards is not yet at hand. Such a diversion of effort could only have an unfavorable effect on the maintenance of the fleet. It will require a maximum effort by the Turkish Navy, with adequate American aid, to ensure that that maintenance is afforded at an acceptable level.

Providing Matériel

Electronics equipment was supplied in considerable quantity to bring up this specific deficiency and to give the Turkish Navy some semblance of the voice transmission facilities expected in modern naval vessels. Ordnance equipment was supplied to improve the armament of existing vessels considered effective enough to warrant such improvement. Most of this was United States ordnance material but a portion was ordered in the United Kingdom to build up ordnance stocks for the British-built ships.

Advantageous use was made of the United States Navy advance base functional components where the tailor-made characteristics of these units suited the needs of the station for which the material was required. These were particularly suited in the situations existing at the mine and torpedo depots, the degaussing station, the minesweeping base, and the fleet repair bases. The supply of United States material to Turkey was certainly unique when contrasted with Turkey's previous experience in absorbing foreign materials into her stocks, in that through the use of these functional components, packaged for the job, and in the ordering of adequate spare parts based on a usage rate, there was, henceforth, provision for the replacement of worn parts. This point may better be appreciated when one reflects on the various sources of Turkish military equipment over the years, and notes that even in 1947 there were 16 different types of torpedoes carried in stock for the few ships—but many types—of the submarine and destroyer fleets. Many of these types had no spare parts. With

the influx of American material, it has been possible to discard much obsolete and ineffective equipment and concentrate maintenance effort on American and British equipment that by now constitutes almost all of Turkey's naval material.

Perhaps the most spectacular items of equipment supplied were the three large Diesel generators that were originally manufactured during World War II for lend-lease aid to the Soviet Union. The termination of that struggle found these still in the United States and they now are installed at the Golcuk base, thereby affording a far more adequate AC power supply than had heretofore existed.

Training Program

The training program undoubtedly was, and still is, the most important aspect of the Naval Group's work in Turkey. The procurement of vessels and capital equipment was a relatively straightforward matter that could be met mainly by a consideration of the requirements and the solution of administrative problems. The training that had to follow the delivery of vessels and equipment called for an exhibition of persistence and mutual understanding among all Turks and Americans involved. Fortunately, these qualities were available and demonstrated by both parties. The requirement for a training effort was realized and included in the planning by the Survey Mission, but its magnitude hardly could be appreciated at that early date. The inclusion of provisions for training selected Turkish personnel in the United States resulted in the arrival, in late 1947, of the first Turkish officers and enlisted personnel in United States Navy service schools. The schools were chosen to ensure that when the aid equipment started to arrive in Turkey there would be Turkish personnel on hand trained for that specific equipment, to assist on its assimilation by the Turkish Navy. This meant that Turkish students were arriving at a variety of appropriate United States Navy service schools to study equipment destined for transfer to Turkey.

The training of the Turks in these schools was aimed at the eventual use of their services to instruct other Turkish naval personnel in comparable schools that were to be established in Turkey. Also, they would be available to assist in the installation of equipment with which they now would be familiar. Consequently, with the shift of the Naval Group to Turkey in the winter of 1947-48, the initial training program in the United States was well under way, and that in Turkey was instituted. Optimum timing would have found a full crew of trained Turks waiting to start training schools in Turkey. Unfortunately, this was not possible of achievement, and training in Turkey was initiated largely with United States Navy instructors, unaided by United States trained Turkish assistants. However, with the passage of time and the arrival of trainees from the United States, this early difficulty was resolved.

Installing Equipment

The training effort in Turkey was first devoted to the task of installing equipment, such as a functional component, and, as quickly as possible, training a Turkish crew to operate it so as to support the arriving items of equipment that depended on this component for maintenance support. This was vital from the logistics point of view, and can be well illustrated by the dependence of mines upon the mine assembly and test component. The limited number of United States Navy personnel also made this procedure mandatory if the equipment was to be cared for and held ready for subsequent shipboard installation and use. Once the crew of a component had been established as a working organization, the United States Navy personnel retreated to a purely ad-

visory position and left the actual operation of the unit to its Turkish team. Hence, there was a gradually increasing training load in Turkey as more and more Turks were trained on the spot by the initially trained Turks of any one unit. A considerable portion of this load ultimately came to be handled by the Turkish naval personnel previously educated for the job in the United States.

Turkish Instructors

The transition to Turkish instructors was simpler in some fields than in others and it was not long before a competent Turkish crew was handling the mine component. On the other hand, the store of knowledge was lower in the electronics field and programs in this category had to be actively directed by the United States Navy personnel for a much longer time. The operation of the electronics school and the installation of electronic equipment in the fleet had to await a full measure of prosecution until Turkish officers and enlisted men had completed the year's course at Great Lakes and had returned to Turkey for service in this dual program. It is interesting to note that at Great Lakes a Turkish enlisted man received one of the highest marks ever attained in the petty officers course. And the Turkish officers compared most favorably with their American brothers. The top Turkish officer graduated with distinction and was number 2 in a class comprised of 50 United States Navy and Marine Corps officers. The Turk can hold his own with any other in student application. His greatest problem is in the later practical usage of his knowledge.

Operational Training

Training in the operation of the vessels transferred started after, but then proceeded concurrently with, training in the operation of the maintenance units. This involved complete operational training programs in the transferred submarine and destroyer types to gain full familiarity with the capabilities and limitations of these ships. Each type was handled by separate United States Navy underway training teams of submarine and destroyer personnel. The same method was carried on in a similar way for the transferred minesweepers with fewer of our personnel and with the emphasis being placed on the operation and maintenance of the sweep gear. Other vessels transferred did not require formal type training programs.

Schools Established

Schools were established to cover the wide variety of subjects encompassed in the operational and logistics training programs and to support the equipment of the aid program. A notable deficiency was filled in the establishment of a submarine school, with a curriculum similar to that at New London, to ensure a regular flow of selected and trained officers into the submarine service. Then, too, there had been no place available to the Turkish Navy to send gun crews to be trained in the firing of the weapons that were carried aboard ship. Such training was only to be had by shipboard firings which necessarily were curtailed to preserve the life of the gun barrels. Consequently, it was deemed an urgent matter to set up on the beach a facility similar to an antiaircraft training center. The relative inexperience of the Turkish Navy in antiaircraft fire emphasized the need for this facility. To provide other functions and to enhance the favorable employment of the gunnery training, it was decided to place radar (operational) and navigation (plotting) facilities adjacent to that for gunnery. This prospect is considered to be one of the most useful aids toward the most effective training of the Turkish Navy. Electronics maintenance training was instituted early for officers

and enlisted men as was the operational side of this subject. This provided some personnel to assist in the electronics installation program.

A United States Navy officer of the rank of commander was, and is, maintained in Istanbul to serve as the Naval Staff Adviser to the General Commanding, Army Staff College. In virtually every phase of Turkish naval endeavor, there is a Naval Group representative working with his Turkish opposite number in an effort to improve the final product. This could not be done by dint of advice alone, but requires a high order of mutual comprehension between the personnel of both countries. The prosecution of the whole program has been remarkable for the presence of this faculty.

Progress of the Program

The progress of Turkey's naval program has been excellent insofar as the acquisition and installation of capital equipment is concerned. It has been slow, but continuously progressing in its training aspects. The number of Turkish naval personnel who have been trained in United States Navy service schools or Mission-sponsored Turkish naval schools of comparable types is increasing steadily. By this fact is measured the progress in acclimatizing Turkish naval thinking to the methods and techniques employed in modern navies. The training program has been pursued vigorously in the full realization that herein lies the real hope of achieving the goal. The ultimate progress can only be appreciated fully when the day comes that Turkish naval units can operate efficiently with allied naval forces in the pursuance of a common mission.

The true measure of Turkish naval improvement perhaps can be measured best by a consideration of just what the Turkish Navy can do now that it could not do before. In reality, the answer to the question of why the Turks need a navy would be illuminating to the same end. While the work is by no means finished, certain definite accomplishments have been realized that will enable us to gauge the work in this field. While any real assessment of the present capabilities of the Turkish Navy must rest to some extent on personal opinion, it is believed that the writer's experience has been such as to lend a certain credibility to his views on the subject. [The writer was a former member of the Navy Group, AMAT.]

The Turkish Navy is now possessed of a much higher percentage of modern units and a shore establishment that can much more efficiently and more adequately support those units. Instead of a heterogeneous collection of vessels and equipment, it now is a small, efficient force of Anglo-American orientation, rather predominantly the latter, with a development and employment plan within its capabilities. As has been mentioned, the installation of capital equipment to this end marks a positive result. The training that must give effective guidance to the usage of this equipment is ultimately a long-term goal with steady but slow advance to date.

Many of the units of the Turkish Navy may be required to operate in seas adjacent to Turkey with allied forces in execution of independent naval missions or in support of ground forces. This they now are prepared to do. It is conceivable that Turkish submarines may have to operate against enemy supply lines in contiguous waters, with very little base support, and against enemy surface units in similar areas. This they now are ready to do. It is doubtful that they could have done this effectively before the inception of the present program. The minesweeping units of the Turkish Navy may have considerable employment in the inland and coastal waters of Turkey. As a result of an augmented force and an extensive training program in all types of sweeping, this is well within their present

capabilities. Conversely, the ability to mine effectively has been ensured by the transfer of the necessary equipment and participation in adequate training in its use. The Turkish Navy may be called on to support the movement of Turkish troops in relatively short, water-borne operations and this it can do to the extent that air superiority is held by the Turkish Air Force. Reconnaissance by the submarines of the Turkish Navy may be an extremely useful mission in a conceivable future situation. This mission can be handled now by that force. The protection of Turkish coastal commerce, particularly as it effects the transport of critical materials, will, perhaps, for a period of time, be charged to the Turkish Navy. Insofar as they do not encounter superior surface forces, they now have this capability.

No Naval Air Arm

The Turkish Navy has no air arm and hence will be deficient in those duties that require contained, integrated air operations to ensure the over-all success of the mission. This air support will have to be derived from the Turkish Air Force but may well be missing when required, because of the fact that the Turkish Air Force, engrossed in its own tasks, may be unable, though willing, to provide that support expected by modern naval units.

Turkey is a maritime nation with about 2,000 miles of coast line and a strong naval tradition. While the Navy has never been as large as the Army, it has been an efficient and proud organization, and a credit to the country. As a maritime nation, Turkey has found the same reasons for a navy that other maritime nations have found. In order that naval tasks may be accomplished, the existence of a navy has been requisite. Even though relatively small, its duties can be performed much more efficiently and economically by its own trained units than by hoping that the other services will tack these duties on to their already multitudinous responsibilities. The Turkish Navy has progressed now to the point where it is ready to perform these tasks in support of the national security and in conjunction with the navies of allied powers.

Future Outlook

The future outlook for the Turkish Navy (and in a similar sense for all United States military programs in Turkey) is largely predicated on the continuity of our aid to Turkey. In the writer's view, the length of that program has a far greater importance than the dollar value. A relatively small yearly investment in equipment and staff advisers will return a much larger dividend to the United States, and to Turkey, than a higher rate of input over a short period. It is submitted that the period over which an aid program should be scheduled, and *planned*, is not 2 years—nor 5—but a generation! This is the only way in which we may assist the Turk to alter progressively his traditional concepts and attain a characteristically modern point of view in relation to the technological world in which he lives. The trend definitely has been established. Time is required to make the change complete. When Turkey's technological progress has bridged the gap of the centuries, her military effectiveness will have a greater potential. Prior to the indoctrination of a whole generation, it is felt that any progress might be undone by a reactionary movement. However, with the use of ample time, the new order can be made a permanent acquisition. Turkey wants the assistance and we can give it. The combination should prove potent.

The Naval Aviation Saga

Digested by the MILITARY REVIEW from an article by Commander J. E. Fenton in "The Navy" (Great Britain) September 1951.

THE Royal Navy's interest in aviation dates from 1908, when it had been decided arbitrarily by the authorities to divide the application of aeronautics between the land and sea services by giving the former the airplane and the latter the airship.

The Admiralty placed an order for a lighter-than-air ship—the *Mayfly*—for the purpose of trials, but, true to her name, she never flew.

Already, the Admiralty was concerned about the menace of German submarine forces in any future war, and, believing that aircraft would be an important asset of the Royal Navy, it started a program to develop this field.

On 1 March 1911, four officers of the Royal Navy and Royal Marines were granted permission to undergo training in airplane work at Eastchurch, while others, at their own expense, started experimental work with seaplanes on Lake Windermere and elsewhere. However, until the end of 1911, the only aircraft the Navy possessed were the gifts of private donors, and no proper organization for their employment existed.

Rapid Developments

The birth of naval aviation in its present form can be considered as taking place in 1912. In that year, Mr. Winston Churchill became First Lord of the Admiralty, and, under his well-known inspiration and enthusiasm, more progress toward the provision of an adequate naval flying service and efficient aircraft was developed during the first 4 months than had developed during the preceding 4 years. Not only did the First Lord himself qualify as a pilot, but, by July, he had announced that a school of naval aviation had been established at Upavon, an airdrome for the naval wing at Eastchurch, and that an Air Department in the Admiralty had been formed to coordinate the various branches of aerial navigation and develop the training and material to the best advantage.

Royal Naval Air Service

The zeal and enthusiasm of Mr. Churchill were indispensable assets in dealing with the spirit of skepticism and indifference with which the new arm was regarded by some of the higher authorities. However, it was not until 1 July 1914 that the Royal Naval Air Service came into being as an entirely separate service from the Royal Flying Corps under the direct control of the Air Department of the Admiralty.

Prewar Developments

Thanks to the Admiralty policy of supporting private enterprise, the Navy had by then been able to acquire several aircraft types, including the Sopwith *Bat Boat* amphibian, various types of seaplanes, and the Sopwith single-seat *Tabloid* biplane, which, at that time, had the revolutionary flying performance of achieving 92 miles an hour, with only an 80 horsepower engine. In addition, by the beginning of hostilities, a string of naval air stations was set up around our coast, and training in radio and bomb dropping was being given priority in the Royal Naval Air Service. One consequence of this was the first successful launching of a torpedo from the air, in July 1914. By August 1915, Royal Naval Air Service pilots, serving in the Dardanelles, first practiced successfully the discharge of torpedoes from seaplanes, and several ships were reported to have been sunk. About the same time, naval

aircraft were successfully carrying out bombardment spotting duties for naval forces of the Dover Patrol, operating off the Belgian coast, and also locating hostile submarines sent to attack the bombarding forces. The first report of a successful attack on German submarines was made on 6 August 1915, when a U-boat near Ostend was bombed and sunk by an airplane.

Deck Launching of Planes

The limitations of operating planes from the surface of the sea were soon appreciated, and several means of launching them from ships were tried out with reasonable success. A launching platform was fitted on the battleship *Hibernia*, in 1912, and the cross-Channel packets *Empress*, *Riviera*, and *Engadine* were fitted with a forward flight deck and a hangar aft. By 1915, the better performance of aircraft fitted with wheels instead of floats had been appreciated, and the packet *Vindex* was specially converted for launching small fighter airplanes from a 64-foot deck. The *Vindex* carried seven planes, and, in August 1916, one of the planes from this ship damaged a German Zeppelin. This was a noteworthy achievement, because Zeppelins were operating with immunity at altitudes above the ceiling of the Navy's float planes.

This was followed by the bold step of appropriating the giant cruiser *Furious*, before she was completed, and building a flight deck by removing her forward turret. In the same year, the battleship *Almirante Cochrane*, under construction for Chile, was purchased for conversion as the *Eagle*, and a contract was placed for the construction of the *Hermes*. The construction of the *Hermes*, although designed to carry only 20 aircraft, and not completed until 1919, was a major advance in naval aviation, and was the first ship to be designed and built specifically as an aircraft carrier.

In the meantime, the need for two-seater aircraft for reconnaissance and the spotting of naval gunfire had been felt, and it became necessary to supplement the few aircraft carried in the seaplane carriers. This was achieved by fitting revolving launching platforms in the light cruisers, and by placing launching platforms on the gun turrets of the battle cruisers. This permitted the planes to be launched into the wind without the ships leaving the line, but suffered the same disadvantage as airplanes operated from the seaplane carriers in that there was no means of recovery, and aircraft, once launched, had to return to land bases or be ditched in the sea.

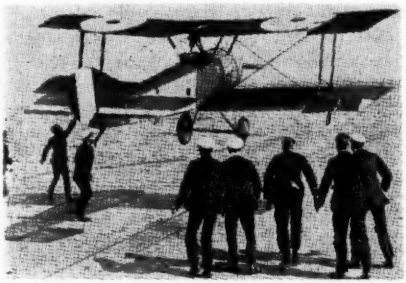
The First Deck Landing

By June 1917, the Zeppelin menace to our cross-Channel sea communications was such that the Dover Patrol was not willing to sacrifice a gun to carry a plane. This gave the impetus to deck landing trials. On 3 August 1917, the first successful deck landing ever made on a ship at sea was accomplished on the *Furious* by crabbing the plane in sideways above the launching deck. At this first attempt, the plane, a Sopwith *Pup*, was grabbed, while still in the air, by a group of officers on deck. However, on the second attempt, a tire blew out, and the plane went over the side, and the pilot was drowned.

Immediately after this, the after turret and main mast were removed, and a landing deck 280 feet long and 70 feet wide was constructed, extending from the stern to the funnel. The aircraft were fitted with skids which were intended to engage fore and aft wires and keep the planes from skidding over the side. In addition, the pilot released a hook which was intended to pick up athwartship ropes weighted by sandbags, and vertical ropes were slung from a gantry abaft the funnel to act as a crash barrier.

Three successful landings were accom-

plished with this arrangement, but the accident rate proved excessive. Further deck landing trials then were deferred until the completion of the *Argus*, in 1918. This ship, originally designed as an Italian liner, embodied most of the first war experience which was gained so painfully. Her 550-foot flight deck was clear of ob-



The first successful deck landing ever made on a ship at sea, on 3 August 1917.

structions, and had an upward slope forward from the midships lift.

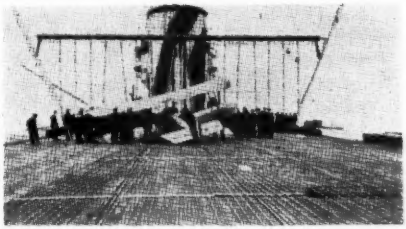
The Fleet Air Arm

After the war, the Royal Naval Air Service came under the jurisdiction of the Air Ministry, and, on 1 April 1918, the Fleet Air Arm was born. It had been argued that one service should be responsible for the design of all aircraft and the training of all aircrews. The Admiralty retained a proportion of the manning of what was now only the stepchild of the Navy, as well as the design of carriers and aircraft torpedoes. The result of this dual control was that the Navy received Royal Air Force designed aircraft of inferior performance, and the development of naval aviation was retarded seriously.

By 1924, independent wheel brakes were fitted to aircraft, and it was decided to remove all wires from carrier flight decks, but to leave the upward slope forward and fit a steel barricade, known as palisades, along each side. This reconversion of the *Furious*, in 1925, was followed quickly by that of her sister ships, the *Courageous* and the *Glorious*.

The need for a carrier to steam into the wind when operating aircraft introduced the old sailing fleet's problem of maneuvering for the weather gauge in order to protect the carrier from enemy attack; and no delays in landing an aircraft could be accepted. This, coupled with a rising accident rate, caused by the higher wing loading and approach speed of new aircraft coming into the service, resulted in the reintroduction of athwartship arrester wires in 1936, and the introduction of catapult assisted take-off gear forward.

The aircraft carrier *Ark Royal*, made famous by both Germans and Italians, who sank her many times by radio, was laid down in 1935 and completed in April 1937. This ship, with an 800-foot flight deck, benefited in design from all the experience gained in the past years of operating aircraft from converted vessels. In addition, crash barriers were intro-



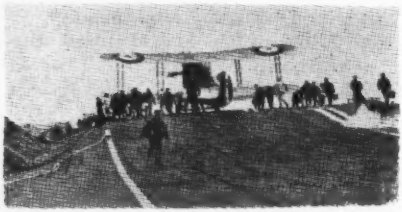
The flight deck of the *Furious*, showing the crash barrier and the arrester wires.

duced, but they did not fulfill the same purpose as in the old *Furious* conversion. These barriers, looking rather like a race course starting gate, are now fitted in all modern carriers across the deck just clear of the landing run of an airplane which has picked up the last arrester wire. They can be raised or lowered quickly as required, and, with the use of this barrier or safety net, a plane can be landed as

soon as its predecessor has been taxied past, thereby decreasing considerably the time the carrier has to steam into the wind away from its covering forces.

Dual Control Eliminated

By 1937, when it was evident that war with Germany was imminent, it was at last realized that dual control of the Fleet Air Arm was by no means satisfactory. The fact that the Admiralty was not granted complete control of naval aviation until May 1939, when war expansion was at its greatest, was unfortunate.



The flight deck of the *Furious* sloped upward until she was rebuilt in 1939.

A Major Weapon

The lessons learned in peacetime, however, had been appreciated, and the Navy, once again running its own aviation, was able to keep the sea supply routes open, without which the war could not have been won.

The strategy worked out during many peacetime exercises had its fulfillment at Matapan, and in the sinking of the *Bismarck*, when aircraft flown from carriers under adverse weather conditions not only shadowed the enemy ships continuously, but slowed them down by repeated torpedo attacks, so that our surface vessels could intercept and engage them.

It is hoped that the lesson learned by the loss of the *Prince of Wales* and the *Repulse*, off the coast of Malaya, and the loss of other ships off Crete, through a lack of adequate naval air support, will never be forgotten.

History has taught us that we must control the seas to be the victor in any conflict. The emergence of air power has not altered this requirement. Air power has added to the weapons of sea power, but it has not supplanted it.

Secretary of the Navy Dan A. Kimball

Furious, in 1925, was followed quickly by

or safety net, a plane can be landed as

Atomic Power for Aircraft

Digested by the MILITARY REVIEW from an article by Norman S. Currey in "Canadian Aviation" October 1951.

REACTIONS of technical as well as non-technical observers to the suggestion of atomic flight vary from pure skepticism to extreme optimism—the former thinking of atomic energy only as dangerous and explosive, something which one should keep as far away from as possible, and which could never be of any peaceful use to mankind. The optimists seem to think that atomic-powered rockets should be taking us to the moon by next year!

Neither of these extremes can be justified by scientific fact. However, at the same time, they both should be treated with respect—atomic energy is certainly a tough steer to rope, but with the present rate of scientific advancement there is every reason to hope that atomic flight will be a distinct, and safe, reality within the next 10 years. The problems are manifold, but by no means insurmountable.

If historic comparisons are of any use, try to imagine the thoughts of those who scoffed at the Wright brothers' attempts to fly, if they had been told that within their lifetime they would be able to cross the Atlantic in a 50-passenger airplane, traveling at more than 500 miles an hour, with meals and cocktails served on board; and the whole contraption propelled by means of taking in air, expanding it, and shooting it out through pipes—a dream which should be realized when the De Havilland *Comet* jet airliners are on scheduled operation.

Basic Principles

The basic principles of an atomic power plant for aircraft propulsion involve the use of the heat developed by an atomic chain reaction and the transformation of this into kinetic energy.

This may be done in several different ways—we could allow it to form steam, and from this derive kinetic energy through a steam engine. Or we could allow it to heat gases to be utilized in a combustion engine, a gas turbine, or a ramjet. It is fairly obvious that a steam engine would be impracticable for use in an airplane, and it appears that a gas turbine or ramjet would be the best methods of utilizing atomic heat for aircraft propulsion.

The actual chain reaction, giving rise to this heat, takes place as a result of the fission of the nuclei of such elements as the U 235 isotope of uranium, or the Pu 239 isotope of plutonium, with escaping neutrons. The nuclei then break up because of instability, and give rise to heat as a result. For those who wish to delve deeper into this phenomenon, it can be explained thus:

If all the decomposed particles of the nuclei were put together it would be observed that there had been a decrease in mass in the decomposition process, and this decrease causes radiation and heat.

The Atomic Reactor

Having established the process by which heat is given off, it now can be seen what is involved in the design of the unit in which the chain reaction takes place—the so-called atomic reactor, or pile.

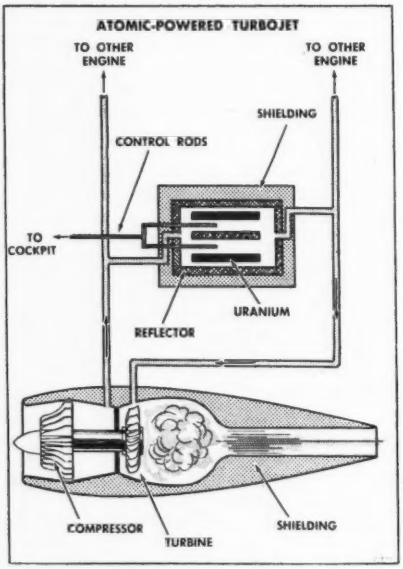
Factors to Consider

There are four factors to consider in the design of this reactor:

1. The chain reaction must be maintained; that is, steps must be taken to ensure that the escaping neutron, which we want to cause fission by hitting one of the nuclei, does not escape altogether without doing anything. One method of

accomplishing this is by slowing down the neutrons by the use of "moderators" and "reflectors"—these take the form of a case round the pile, and have the effect of reflecting the escaping neutron back into the center of the pile again so that the neutron is bounced about sufficiently to find a nucleus into which to bump.

2. It is necessary to make sure that use



can be made of the heat developed. This can be accomplished by ducting the hot air to either a heat transfer tank, or directly to a gas turbine or ramjet.

3. Another problem is protection from radioactivity. This is done by suitable shielding. It is the short-wave gamma rays which are, by far, the most serious, and these can be shielded only by heavy layers of lead at present, though there is little doubt that, with the present rate of scientific advancement, some more suitable, lighter material will be found by the time atomic aircraft become a reality.

4. The final problem is control. Basically, this can be accomplished by inserting neutron-absorbing rods into the pile. In other words, those rods are inserted to absorb the neutrons instead of allowing them to bounce about breaking up nuclei. So, movable rods are installed into the reactor which, when halfway in, hold the unit in balance, and when gradually taken out increase the power.

What It Will Look Like

We are now, therefore, in a position to see roughly what our atomic reactor will look like—it probably will be enclosed in a heavily shielded cylindrical body, with inlet and outlet pipes for gas, or liquid (depending upon the propulsive medium being used). In the center of the cylinder there is the uranium or plutonium, and around this a reflector. The whole unit then is controlled by movable rods.

Types of Atomic Power Plants

There are three types of atomic power plants suitable for aircraft. They are a closed-cycle propeller-turbine, a turbojet, and a ramjet.

If the closed-cycle propeller-turbine is used, the air is compressed at the front of the engine, and bled off from here to the atomic reactor, which then would heat it up tremendously. It would pass through a heat exchanger to vaporize water or mercury, and the steam then would pass through to the turbine, expand, and drive the turbine, which, in turn, would drive the airscrew.

The steam then would be condensed in an air-cooled condenser, and fed back to the compressor inlet, thereby completing the cycle. The main disadvantage with this type of system, however, is that forward speeds are restricted by the use of the propeller, and as one can realize almost any desired forward speed without noticeable increase in the use of uranium, we are not, therefore, taking full advantage of the atomic power.

The turbojet engine does take full advantage of atomic power. It merely uses the atomic reactor to replace the present-day combustion chambers. The compressor compresses the air, and forces it through the reactor. The air is heated by convection, and then passed back to the turbine where it expands sufficiently to provide enormous thrust, and also keep the turbine rotating, which, by virtue of an interconnecting shaft, keeps the compressor moving. This type of power plant could give us almost any desired speed.

The ramjet is the simplest engine of the three, in that we mount the reactor right in the engine itself, just aft of the entry duct. The air is compressed by the fast moving aircraft, and then passed directly through the reactor, where it is heated. Coming out of the reactor it passes into the exhaust nozzle where it expands and gives tremendous thrust.

The disadvantage of this engine, however, is that the aircraft must be flying fast for it to function at all, so some type of rocket-assisted take-off probably would be required.

The best position for the engines would be as far away from the pilot and passengers as possible, thus making the shielding problem much easier. A wing-tip position might be envisaged. Or, in the case of a twin-engine turbojet aircraft, the engines could be on the wing-tips with a single reactor mounted near the tail.

The engines should be made as simply as possible because of radioactivity in the parts—the smaller the number of radioactive parts there are to maintain, the better—a good argument in favor of the ramjet.

The Atomic Aircraft

The aircraft itself should be large, long range, and very fast to take full advantage of atomic propulsion. It should be large because of the severe weight penalty involved in the use of heavy shielding. The weight of the shielding would be just as large in a small aircraft as a large one, so if we install it in a large aircraft the percentage of the all-up-weight could be kept within reason.

The long-range and high-speed qualities are rather obvious—atomic power makes them available without any penalty whatsoever, so why not make full use of them?

We have seen how feasible an atomic-powered aircraft can be. Still, there is a multitude of problems facing us, mostly those related to radioactivity, but they can all be overcome. When applied to a rocket motor, we shall be able to operate outside the earth's atmosphere, as the propellant would be vaporized in the atomic reactor and squirted out through the exhaust nozzle at high velocity—no part of the system being dependent upon atmospheric air. Thus, interplanetary travel may not be as far away as some think.

The complexity of modern war has made the military more dependent than ever before on civilian scientific and industrial genius.

General J. Lawton Collins

An Analysis of the Soviet Submarine Threat

Digested by the MILITARY REVIEW from an article in "The Navy" (Great Britain) July 1951.

THERE is a widespread tendency to assess the potential menace of the Soviet submarine fleet solely in terms of the total number of these craft available to the USSR.

It is the purpose of this article to suggest that such an approach may be misleading. Viewed from the standpoint of those charged with the security of our communications by sea, it is submitted that the important figure is the average number of submarines which can be maintained at sea.

In responsible circles, the upper limit of the figures quoted credits the Soviet Union with a total force of about 360 submarines. Of these, at least 150 can be disregarded, for our present purpose, either as having been built before 1939 or as being of types unsuited to ocean warfare. If allowance then be made for trials, training, refits, weather, time on passage, and certain "imponderables" such as the bombing of enemy submarine bases and the mining of the approach routes, it may be estimated, in the light of war experience, that, of the remaining 200 odd vessels, some 30 to 40 might conceivably be in their operational areas at any given moment.

This figure is of interest in that it corresponds to the number of U-boats deployed against us *at sea* by Germany in the closing months of 1941.

At that time, our total antisubmarine forces comprised something under 350 vessels of all types. Today, the Royal Navy and the Royal Canadian Navy alone can muster 300 antisubmarine craft between them, excluding the destroyers of the Daring Class under construction.

As a matter of straight comparison, we stand about where we did in 1941, but it may be argued that the foregoing analysis takes no account of the improved performance of the modern submarine nor of the age and slow speed of some of our antisubmarine vessels. Let us consider, first, the question of the submarine alleged to be capable of high speed when submerged. It is a fallacy to assume that the knowledge and skill of the best German technicians is exclusively available to the Soviets. The truth is that both Great Britain and the United States command the assistance of top-ranking Germans in this particular field of development. However, apart from this, it has been rightly stated by the First Lord of the Admiralty that there is no naval power which has a greater knowledge of the subject than we possess ourselves.

There is all the difference in the world between a purely experimental craft, capable of high submerged speed for a limited period, and one capable of such speed under operational conditions. While we should not discount the possibility of a small number of high-speed submarines being encountered, should an emergency arise in the near future, it is believed with some confidence that we have adequate resources to deal with that eventuality. It is believed with equal confidence that some years will elapse before the really high-speed submarine becomes a universal and practical proposition.

This leads on to the second point regarding our available antisubmarine forces. Once again, mere numbers must not be allowed to mislead, and it is altogether without question that some of our antisubmarine vessels are comparatively slow, and that many are or have been in reserve.

Postwar Developments

Against this must be set the fact that

the postwar period has been devoted to the intensive development of new weapons and methods of detection. The time and money so spent now is bearing fruit, and ships are being built or converted to carry the new equipment. For example, the destroyers *Rocket* and *Relentless* are under conversion as fast antisubmarine frigates, with three more similar ships to be converted this year. Specific information as to the performance of the new equipment is unlikely to be made available but by taking a line from the original depth-charge through its wartime successors—the "Hedgehog" and the "Squid"—it becomes abundantly clear that the curve of probability of success in an attack on a submarine is ascending fairly steeply.

The latter is a point of some importance, because it means that for every 100 submarines attacked, far more are destroyed than in 1941, and this is merely another way of saying that the new equipment makes the modern antisubmarine vessel the equivalent of more than one of her 1941 counterparts. As the equipment has been designed to deal with the fast submarine, and as it is being fitted in fast antisubmarine vessels, we reach the unescapable conclusion that the spearhead of our counterattack, both in numbers and in quality, is adequate to meet the number of fast submarines likely to be available *at present* to a potential enemy.

With regard to the ships in reserve, it is to be noted that they have not merely been kept in cold storage, but have, as far as possible, been maintained in such a state as to become effective on being manned. Thus, what may be termed the main body of the counteroffensive again should be adequate, both in numbers and in quality, to deal with the main body of the attack.

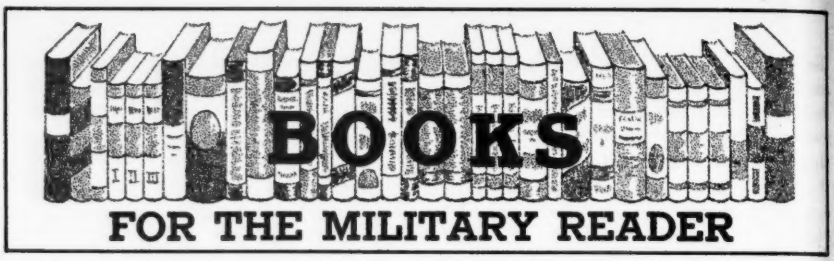
Combined Defense Force

The most significant feature of the present situation, however, is that in 1941 we stood alone. Today, our preparations are integrated with those of other nations, whose naval forces would operate *from the beginning* on a basis of agreed tactical doctrine, tested and proved in practical exercises at sea.

Nonetheless, it is by no means intended to infer that there is room for complacency, particularly in regard to the opening stages of a submarine threat to our sea communications, and the writer is aware that the matter is seen in its proper perspective by the responsible authorities. This is true as regards the provision of adequate air co-operation, an essential feature of modern antisubmarine operations. The resurgence of interest in the employment of helicopters in an antisubmarine role, both in this country and in the United States, therefore, has been welcomed in naval circles as directed to fulfilling a requirement which is not always easy to meet by the use of conventional aircraft, whether shore based or carrier-borne.

Summary

If, as the foregoing view of the situation suggests, we are no worse placed than in 1941 to meet an immediate threat, it is believed that the close and continued integration of developments can serve to keep the United Nations ahead of any intensification of that threat. Whatever the truth, it is maintained that this approach is more tinged with realism than is the reverse picture, currently circulating, of a simultaneous attack by some 500 high-speed Soviet submarines on comparatively defenseless convoys.



THE SERVICEMAN AND THE LAW. By Colonel Morris O. Edwards, *Infantry*, and Colonel Charles L. Decker, *JAGC*. 401 Pages. The Military Service Publishing Co., Harrisburg, Pa. $3.50.

BY CAPT SIDNEY J. WALKER, *JAGC*

This book is intended as a supplement to the *Manual for Courts-Martial, United States, 1951*. It is divided into three parts —trial prevention, courts-martial, and practical illustrations. Additionally, it contains 12 appendices useful in the administration of military justice.

The section on trial prevention is written from the viewpoint of the line officer and is designed to tell how and why the law in the armed forces differs from that in civilian life, and how to practice preventive discipline by good leadership. It explains to the serviceman the meaning of the term "military status," how such status differs from his civilian life, and what that military status means in the relationships of enlisted persons with each other and with superiors. It tells the serviceman what military safeguards he has and how they compare with civilian safeguards. Part One also emphasizes good leadership and how it can be attained, and tells the military leader how he may best administer nonjudicial punishment.

Part Two deals with the courts-martial proper. In chronological order, it takes up the preparation of charges, investigation of charges, duties of the trial counsel and defense counsel, and, generally, the duties of the three courts-martial; namely, the general, special, and summary.

Part Three contains some very useful problems in procedure, outlining sets of facts, and giving the solutions for drafting the charges and disposing of the case. In addition, it includes an examination on military laws, consisting of 215 questions, and refers the examinee to paragraphs in the *Manual for Courts-Martial, United States, 1951* for the answers.

This book is recommended reading to all personnel in the armed forces, and especially to those entering the armed forces. The many cross-references to the *Manual for Courts-Martial, United States, 1951*, make this book an especially useful supplement for use in connection with that Manual.

THE MARINES WERE THERE. By Robert Bruce Lockhart. 229 Pages. British Book Center, New York. $3.00.

The story of the Royal Marines in World War II.

THE UNITED STATES AND JAPAN. By Edwin O. Reischauer. American Foreign Policy Library. Edited by Sumner Welles. 357 Pages. Harvard University Press, Cambridge, Mass. $4.00.

A HISTORY OF CHINA. By Wolfram Eberhard. 374 Pages. University of California Press, Berkeley and Los Angeles. $4.50.

A survey from the earliest times to the present day.

THE PURSE AND THE SWORD: Control of the Army by Congress through Military Appropriations. By Elias Huzar. 417 Pages. Cornell University Press, Ithaca, New York. $4.50.

BY COL ROY W. MUTH, *CmlC*

The Purse and the Sword is the result of a thorough and impartial examination of how the Congress influences our military power and administration through the mechanics of the budget and the appropriation bill which it submits for Presidential approval. Elias Huzar, the author, painstakingly describes the basic philosophy which established, in the Constitution, the congressional power over the military forces of our country.

The author then develops the magnitude of the responsibility which the Constitution imposes on the Congress. How can any individual or small group of individuals comprehend intelligently the detailed proposals running into thousands of pages for the expenditure of many billions of dollars? To solve this problem, the small committees in the House and Senate must reduce this mass of data to reasonable proportions. Under the present system, it taxes the resources of the most experienced legislators in our public service. Many years of periodic inspections of the military budget, combined with a perception for critical spots in the projects and their justification, is necessary.

Long contact with military officials and their budget problems reduces the size of the task in two ways. First, continuing requirements—those which appear in the budget year after year—only have to be examined for need, differences, and increases or decreases since the committees already have satisfied themselves as to the original necessity for the project and its approximate cost. Second, the committees place great confidence in some of the administrators of the military funds. An illustration of this confidence is found in a 25 million dollar (later increased by 125 millions) contingent fund "for such emergent military uses as the chief of staff may determine to be necessary, to be expended at his discretion, notwithstanding any other provision of law," voted General Marshall, by Congress, in 1941.

Confidence also may be developed by questions which the committees pose to the officer "defending" a particular portion of the budget. Thus, a chief of one of the services may be asked a series of questions designed not so much to elicit information as to determine how good a grasp of his job the administrator has. Or the administrator may find that a straight-forward presentation has, in itself, won for him the esteem of the committee and saved him from detailed questions on his activity. There is much food for thought, by military men at all levels, in the implications of the confidence so inspired.

However, the most interesting and fascinating aspects of the budget problems, are the complex attitudes of the committees which may be the result of world conditions, the state of the national economy, jealousy of prerogatives, or their political or personal inclinations.

Mr. Huzar concludes his work with a chapter entitled "Toward a Tighter Purse and a Sharper Sword." Here, he recommends the remedial action necessary for a more intelligently prepared appropriations bill.

The recent passage of a 56 billion dollar "peacetime" defense bill may have caused considerable amazement. *The Purse and the Sword* shows how and why such a bill gets the approval of Congress. For this understanding, alone, the book is worth reading, for readers of this fine study are stripped of the false opinion that these hearings either are a game or the scene of arbitrary indulgence or denial of the military's pleas for the support of their projects.

THE NEAR EAST & THE GREAT POWERS. Edited by Richard N. Frye. 214 Pages. Harvard University Press, Cambridge, Mass. $3.50.

By CAPT SELWYN P. ROGERS, *Armor*

This work is a well-edited compilation of general discussions and papers on special topics concerning the Near East, which, from the standpoint of our interest in global affairs, is most certainly a danger spot. Several authorities on the Near East presented these ideas at Harvard University in 1950, and have gone to the core of the Near East problems in capably painting a word picture of conditions in the Arab world and Israel.

The Near East, with its internal problems and its position in Great Power politics, is shown to be neither East or West nor a synthesis of these divergent areas. Its countries are described as an arena of strife and jealousy. This arena is described in detail.

The book, a short one and easy to read, crystallizes the fact that "the ultimate problem which we are facing is how to get the ideas and objectives of democracy across to the peoples of the Near East, and what that means to us and for them." Dr. Ralph Bunche, in the introduction to this book, writes that "fundamentally, we need to come to a realization that it is not necessary for people to do things as we do them, to live and think like us, to order their social and economic and political lives on an American model or something approaching it, in order for them to be good people, people worthy of our full respect and understanding."

For those who have viewed with intellectual curiosity the present Iranian problem and recent assassinations of prominent Arab leaders, this book provides an interesting background.

FORGOTTEN PATRIOT: ROBERT MORRIS. By Eleanor Young. 280 Pages. The Macmillan Company, New York. $4.00.

SINK 'EM ALL: Submarine Warfare in the Pacific. By Vice Admiral Charles A. Lockwood, USN-Ret. 416 Pages. E. P. Dutton & Co., Inc., New York. $5.00.

By CAPT RICHARD H. HANSEN, *Arty*

This book is a detailed record of submarine warfare in the Pacific, combined with a heart-warming story of the men the author served with and commanded.

It is a step-by-step account of the maneuvers and battles of our forces to regain control of the Pacific (with particular emphasis on submarines) and of the close work between the various branches of the armed forces to achieve that goal.

The military reader will find this book an informative and interesting record of the action in the Pacific. The man who has served, or is still serving with "The Silent Service" will find this book a diary of Pacific victory.

KILL OR GET KILLED. By Lieutenant Colonel Rex Applegate. 316 Pages. The Military Service Publishing Company, Harrisburg, Pa. $3.75.

BY MAJ RICHARD T. KILPATRICK, *MPC*

This book, written during World War II and based on the author's experience during that war, was intended, primarily, for use as instructional material in training large groups of men.

It describes in detail the principles of unarmed combat, the use of the hand and shoulder guns, disarming, the handling and control of prisoners, and other subjects closely associated with hand-to-hand fighting. It differs from most publications in that it deals with the mental as well as the purely mechanical aspects of the subject.

Kill or Get Killed is valuable for use in teaching hand-to-hand combat, either as a complete text or as a supplement to other training publications.